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SUGGESTION OF A TRADING SYSTEM FOR STOCK INDEXES

NÁVRH OBCHODNÍHO SYSTÉMU PRO AKCIOVÉ INDEXY

DIPLOMOVÁ PRÁCE
MASTER THESIS

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MASTER'S THESIS ASSIGNMENT

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In the Czech language:

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Instruction:

Introduction
Aim of the Thesis
Theoretical Background
Problem Analysis and Current Situation
Proposals and Contribution of Suggested Solutions
Conclusions
References

List of literature:

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ABSTRACT

The work aims to create a trading system for intraday trading of U.S. stock indices. In the theoretical basis, he author focuses on the explanation of basic concepts of trading U.S. indexes on intraday basis and trading in general. The next chapter describes the present situation - creating a business plan and explaining the principles on which the plan is based. The design part presents a complete system for intraday trading of U.S. stock indices.

ABSTRAKT

Práca si kladie za cieľ vytvorenie obchodného systému pre intradenné obchodovanie US akciových indexov. Autor sa v teoretických východiskách zameriava na vysvetlenie základných pojmov obchodovania US indexov na intradennej báze a obchodovania všeobecne. V ďalšej kapitole je popísaná súčastná situácia – tvorba obchodného plánu a vysvetlené principy na ktorých je plán založený. V návrhovej časti je predstavený kompletný systém pre intradenné obchodovanie US akciových indexov.

KEY WORDS

US stock indices, futures, stop-loss, e-mini contracts, Sierra Chart, intermarket divergences, intraday trading

KĽÚČOVÉ SLOVÁ

US akciové indexy, futures, stop-loss, e-mini kontrakty, Sierra Chart, intermarket divergencie, intradenné obchodovanie

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Bc. Adam Ehsan

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CONTENT

1. Introduction

Trading was in history clouded by a variety of myths. For some people, traders/investors represented a secret society, for other they were pure thieves.

With the expansion of Internet, more and more people have started to discover the real nature of trading business. The first decade of 21st. Century has seen massive expansion of trading through electronic means in all its forms.

Especially, intraday trading started to be a lot popular among small retail traders due to its ability to generate tens of percent growth in capital for each year.

Also small initial capital requirements play a significant role for new traders when deciding which trading system to start with.

However, many beginners only see the potential profits from trading, but not potential risks. They enter into the business without any serious plan how to start, what to trade, when to trade, what strategy to deploy, how to manage their capital, etc.

This paper offers answers or at least guidance to all mentioned above.

2. Aim of the Thesis

The goal of master thesis is to provide a suggestion of intraday system for trading stock indices.

In the beginning of paper, author will present trading as a business, what trader can trade and where.

Later in the paper, author will present style of trading, main approaches to market analysisis, software solutions needed for trading and how trader has to manage his capital in order to become profitable.

The analytical part presents an idea of system with its main principles and then testing of system on historical data with its results. Later in the part, paper trading or testing of system with real live data, however without risking real money, is shown. Again, results are presented with deep analysis of what happened and how system could be in future improve.

The recommendations and proposals part offer a complete trading strategy for intraday trading of stock indices. Author summarizes all facts from theoretical and analytical part into one unit. The proposed system is recommended to use with US stock indices, specifically with e-mini markets S&P 500, Nasdaq 100 and Dow Jones Industrial Average, but the robustness of system allows it to be deployed with whichever markets with tend to strongly collate between each other.

3. Theoretical Background

3.1 Trading

Trading or by some people also called active investing is in first place a business as any other. It is not a game or entertainment. It is a serious way of making money and as any other business it requires time and strategy (Financnik, 2008).

Trading as business is in United States for many years quite common method how people earn their money. Trading offers quick way how an individual can acquire significant amount of wealth. On the other hand, trading can lead others to the edge of personal bankruptcy.

It is wise to understand that trading as any other business comes with some amount of risk. If someone establishes a grocery shop or bakery and there will be no customers or poor quality of sold food, the business will probably end in bankruptcy. The same can be applied for trading. If an individual does not prepare himself for trading, i.e. there exists no strategy how to trade, his trading venture will fail.

To some, trading can be a simple and quick way of earning money (Elder, 1993). However, nothing can be more distant than that opinion. Trading is considered by many to be one of the hardest professions.

In order to become successful trader, one must create his strategy. Every strategy should have define when, how, why trader should risk money, how much he will risk and what are potential profits for those risks.

3.2 Futures and futures exchanges

3.2.1 Futures

Futures are a financial contracts obligating the buyer to purchase an asset (or the seller to sell an asset) at a predetermined time in the future. Asset could have form of physical commodity or financial instrument. Futures contracts are standardized contracts of predefined quality and quantity (Investopedia, 2012).

The futures markets are characterized mostly by high leverage, i.e. the trader needs to have significantly smaller capital at disposal than is actual price of whole futures contract. In order to buy or sell futures contract, trader must deposit a margin by the broker.

In futures markets, trader can speculate on the long and short side too. Speculation is by many considering only as buy low and sell high (Elder, 1993). However, in futures market, one can do exactly the opposite too. That means to sell high and buyback low. In short term trading, which will be described later in the paper, sometimes more than 50% of all trades are on short side.

Futures contracts include a variety of assets ranging from stock indices to energy commodities, grains, meats, currencies, metals or softs.

Futures can be traded in full or mini contracts. Full contracts are more expensive to trade with, have bigger point value and can be more aggressive in terms of volatility. Mini contracts or e-mini (electronic mini) are smaller copies of full contracts and are very popular among traders, especially small retail ones.

Every contract has its expiration period, called last trading day. This is the day of settlement, when physical orders of contracts are being processed. Most futures have

several expiration periods in calendar year such as stock indices, which expire in March, June, September and December[1].

The major United States stock indices include S&P 500, Nasdaq 100, Dow Jones Industrial Average, and Rusell 2000.

These indices are structured from individual stocks of most important US companies. For example, S&P 500 is composed by 500 major US companies from all sectors of economy.

By 31.12.2012, index has been composed by these sectors of economy (Appendix A).

The top five constituents in June 2013 were Exxon Mobil, Apple, Microsoft, Johnson & Johnson and General Motors.

The S&P 500 is traded at Chicago Mercantile Exchange (CME).

3.2.2 Futures exchanges

The most worldwide known futures exchanges are Chicago based CME or EUREX operated by Deutsche Börse in Germany or Intercontinental Exchange (ICE) in London, United Kingdom.

For example, CME has achieved more than 10 million of traded contracts per day in July 2013, what makes it one of the most liquid exchanges in the world[2].

These three exchanges are the main playfield for majority of futures trades. They offer variety of future contracts from standard such as grains, softs, and energies to more exotic assets such as real estate or weather futures.

[1] For more information go to http://www.cmegroup.com
[2] For more information, go to http://investor.cmegroup.com/investor-relations/index.cfm

3.3 Styles of trading

There exists many ways how to approach to the markets in terms of managing the capital.

The very basic concept is to divide styles into a passive and active (Nesnidal and Podhajsky, 2005).

Passive approach could be characterized as a buy and hold style (Williams, 1998). This style is often used by investor who does not want to exceed by his actions the performance of market (benchmark). Basically, investor buys or sells the underlying assets and waits for the market to move in expected way (up/down). Investor does not actively interfere into open positions. This style is preferred for investing money in long term period of time (5+ years). However, in recent years, especially due to financial crisis, many investors changed their attitude towards this style of investing and are more and more trying to invest in active style.

Active approach could be characterized as an active interference into the positions, which are being held (Turek, 2008). Investor is trying by his actions to outperform the benchmark of the particular market in which he holds underlying assets. Active approach is much more time and knowledge consuming in comparison with the previous style (Dvorak et. al., 2008). Investor should be able to analyse the factors which have the biggest influence on the price movement and adjust his positions in the market to the situation.

The active approach in general can be divided in two big categories:

- discretionary trading;
- mechanical/system trading.

Discretionary trading can be characterized as trading approach based on whether the trader decides to enter or not into trades according to available information at the moment of enter. Hence, trader includes in the decision making process his experience and *"feelings"*

(Milton, 2012). It does not mean, there are no rules or system of trading, but trader has still the opportunity not to enter if there are some information missing.

The opposite represents mechanical or system trading. Mechanical trading is rule based trading and when criteria are met, the trade will be executed (Milton, 2012). Hence, the mechanical trading is very suitable for fully automated trading executed by computers.

For the purpose of this paper, author will solely be writing about discretionary style of trading and steps needed to successfully build a discretionary trading strategy.

There are numerous ways how to actively manage capital, but the author will focus in next paragraphs on two main approaches, which are used in markets. Those approaches reflect how the position is opened and closed in the time or how long is trader willing to hold open position and how much money must risk for particular style of trading.

- Intraday trading
- Positional trading

3.3.1 Intraday trading style

Intraday trader is a person, who keeps open positions in the market only during the period of one trading day (Nesnidal and Podhajsky, 2010). Trader opens and closes his position/s on the same day. The trade usually ranges from seconds to minutes or several hours, but doesn`t extend the particular trading day. Intraday trader uses graphs based on 1 up to 30 minutes, with minimum use of daily or weekly graphs. In some special situations, trader uses alternative graphs based on volume or other data than time (Financnik, 2011).

Intraday style has the following advantages (Financnik 2004, Turek, 2008, Stybr, 2011):

- **Every day is a new day** - it is much interconnected with the psychology aspect of trading. Every trading day ends with closing of markets and so trader closes his position (no matter if profit or loss). This means, that trader doesn`t carry the results

from day 1 to day 2. Also the trader can analyse the trades he made during the day and can think over how to improve his style. However, in real life, many traders have significant problems if loss/losses occurred in the beginning of trading week and many times, their psychology is very affected by this despite the fact that one day in intraday trading means nothing.

- **No positions held overnight –** there is no risks of gaps, margin requirements are significantly lower which is very suitable for smaller accounts (overnight margins are usually 2x times higher than intraday margin, see Table 2)
- **Lower risk** – intraday trader trades for significant smaller price movements than positional trader and so his risk for the trade is also lower. Intraday trader usually trades for profit of 200-300 USD (depends heavily on the particular market, volatility, trading strategy) and his stop-loss in these situations in around 100-150 USD per contract. However if trader would like to apply positional style of trading, he would need to use much bigger account.

  The example:

  Entry strategy is based on entering into the trade on strong support or resistance levels. If the price touches the level and then immediately bounce off, the trader would enter on the close of bounced bar. SL would be applied 2 ticks under the high/low of bar depending which side trader opens the position.

  If applied intraday, the bar has price range of about 1.5 point. SL would be then 2 points (100 USD). If the similar system would be used on positional trading, average bar on daily chart has range of 10 points (500 USD). As can be seen, positional trader needs to have much bigger capital at disposal.
- **Lower margin requirements** – the exchanges and brokers take into account lower risk associated with intraday style of trading (gaps, price movements, etc.) and that`s why they offer significant lower margins for intraday traders compared to positional traders or long term investors.

As you can see on table number two, margins are approximately half the price required for positional traders. Margins in this table are for markets, which author trades (ES, YM, and NQ). Data are used from broker Interactive Brokers, who is also primary broker of the author. Price required for margin has significant effect on how many positions can trader open simultaneously. Many traders underestimate this factor, but an experienced trader must take into account how much money can be used for margins and thus how many contracts can he open. This has also effect on how the trade will be managed (number of contracts determines where profit targets will be placed in the market). For margin requirements, see Appendix B.

- **Smaller initial capital required** - intraday trading requires significant smaller starting capital comparing to positional style. Trader can start less expensive markets such as e-mini Dow Jones or e-mini Nasdaq with capital less than 5000 USD.

The disadvantages of intraday style (Financnik, 2004, Turek, 2008, Stybr, 2011):

- **Large time requirements** – trading in general takes a lot of time to learn. It is very different type of business and cannot be learn at school. And intraday trading is considered by many the toughest of all styles of trading. A man needs years to become really experienced. Trader must spend several hours every day just by watching how markets move and by developing and testing his system. And of course, trader must sit and watch markets during trading hours, because possible trade situations can occur and vanish almost immediately.
- **High demands on the psyche** – intraday traders spent almost half a day in front of computer and trading. When trade is opened, psychological aspects which affect trader (greed, fear, anxiety, happiness, excitement) are tremendous.

  Let's show it on example: *Trader enters the trade in S&P 500 at price 1500, his stop loss is at price 1498 (100 USD), profit target at 1504 (200 USD). Every detail*

of the system shows in favour of trade and thus trader decides to enter. Right after entering the market, price starts to rise. Happiness and excitement starts to take control of the trader and he stops to see the reality and begins to project "his" version of reality, where there is just his profit and no obstacles in the graph to achieve it. Suddenly the prices start to chop in range of 1501.75 to 1502.25. The actual profit is around 100 USD. A price hits on strong resistance level, which tends to resist. But because the trader sees "his" reality and thinks only about one possible result of the trade – profit, he doesn`t want to accept the fact that price actually reached the maximum high and he should leave the trade immediately. So the trader waits. Price is still fighting with strong resistance level and then (predictably), it bounces off and starts to fall. An experienced trader would have exit the trade far before this happened. However this trader still hopes that price will reach his profit target. The result of the trade is stop loss and undermined psyche of trader.

This example should have served as an illustration of how important and sadly underestimated by many the psyche is for intraday trader. The example is based on live trading experience of the author.

- **Limited profit -** as written above, every day is a new day. That means, that intraday trader always closes his position in the end trading day and thus his profit is limited by this time period.
- **Specialized, more expensive data –** some intraday traders don't use standard charts based on time, but use charts based on bid/ask difference or volume. These types of data are called tick data. Not many brokers offer this type in standard package and that's why traders have to buy them from specialized companies. The data could cost from 70 up to 200 USD per month. For more information, see chapter Software and data.

- **Seconds for Decision**– entries could occur and vanish very fast (depends on timeframe and strategy). Intraday trader has to make decisions whether to take or leave the trade in seconds or minutes. It requires from trader to be ultimately focused and also to have prepared detailed trading strategy. It is also viable to have prepared potential levels where to enter and exit the trades.

3.3.2 Positional trading style

Trades are held by trader more than a day. Traders speculate on price change in bigger horizon ranging from 2 days up to several months or even years. Some traders can also speculate based on seasonal cycles (especially commodities such as grains, meats, metals, energies).

The biggest advantages of positional trading are as follows (Dvorak, et.al., 2008, Nesnidal and Podhajsky, 2005):

Less time consuming - because trades are open for longer time period, that also means entry patterns are not as often as by intraday trading. Trader doesn`t have to spent all trading day in front of computer waiting for such patterns. He can plan some levels, where possible patterns can occur and wait for price to come to those levels. Also, once in trade, the position doesn`t require full day attention of trader. If the trade is planned for month or more, trader can spend by managing the trade only couple of minutes a day.

Less stressful – trades are planned to take weeks or months, adverse moves against open position don`t stress trader so much as by intraday trading. However, it doesn't mean there is no stress. It is still very stressful to see price go against our position for days or even weeks.

Free market data – for long term trades, trader doesn`t need specialized, tick data as for intraday trades. For some positional strategies, trader doesn`t even need real time data. Free data are provided by many financial websites such as Yahoo Finance, Barchart, Financial Times. For more information, see chapter Data.

More time to decide - by author`s opinion, the biggest advantage of all. Trader can analyze possible trades for hours or days before making decision.

No limited profit - positions are held for weeks or months and trader can take advantage of bigger trend and stay with it for a long period of time.

The disadvantages of positional trading are as follows (Dvorak, et.al., 2008, Nesnidal and Podhajsky, 2005):

- **Gaps** - information influencing price movement could occur almost 24 hours a day. Price could be affected by these unexpected situations even when the market is closed. At the end of trading day, price ends at 1500 but after for example a disaster in Australia; price can open or leap to 1490. This price difference is called gap. What is dangerous for trader is fact that price could skip his stop loss. Trader must take into account that his loss for a trade could be bigger than planned and must adjust his business plan to this fact.
- **Bigger margin requirements** - as was written in intraday section of this chapter, overnight margins are usually two times bigger than "day" margins (see table number two). It means for trader that he cannot open as many positions as by intraday style in the same market.
- **Bigger initial capital required –** average risk for one trade is usually at least one day price movement is the particular market. As was written above, in S&P 500, average day movement in July 2013 was circa 15 points (500 USD). Trader must

adjust his capital to these requirements. Also must take into account bigger margin requirements.

- **Less opportunities** – positional trading doesn`t offer trade every day. Sometimes, trader could wait for the entry pattern even weeks. This gives increased demands on his psyche. On the other hand, trader can diversify his capital simultaneously into more markets which will possibly lead to more trading opportunities.

3.4 Brokers and trade orders

3.4.1 Brokers

The broker is a middleman, an entity, through which a trader gains access to the markets (Nesnidal and Podhajsky, 2005). If a trader wants to buy or sell (it is not important what type of asset), he has just two possible options.

First one is only for real professional traders with big capital at disposal. The trader can buy a spot at the exchange itself and trade from terminal which is placed in the exchange building. However, this spot costs millions of dollars a year and in recent years with drastic improvements in Internet services and information technologies in general, this method is on the decline.

The second option is to find an entity which gives us access to the markets. There are numerous brokers from which to pick up. The most brokers come from United States, but of course there exist other brokers from the entire world.

For the access to the market, broker always takes commission from trader. Commission is charge, usually fixed amount of money for entering and exiting a trade. The commission depends on the services trader requests from the particular broker.

In general, brokers could be classified as (Turek, 2008):

- **Full service** – this type of broker provides among other things consultations, hints, tips, recommendations for trades (services provided may vary through full service type brokers). These brokers are mainly used by beginner traders for whom the broker serves a helper or assistant. However, one must be aware that full service broker is much more expensive than other types described below. His commission could be in some cases 5x times higher than the commission of discounted or online

broker. This could have significant effect on profit income and trader must adapt his strategy to this factor.

- **Discounted service** – less expensive type of broker, but with lesser support too. Broker only provides access to markets and minor support in form of hints and tips. The trade orders are usually given by phone or email.
- **Online service** – the cheapest variant of all three types. Broker provides online trading platform (see chapter Software). The trader needs to have computer and stable internet connection to be able to execute his orders through trading platform. The trading platform is usually given for free. The biggest advantages of this type are commissions. They are far lowest among all mentioned brokers. Also, every order is executed through platform almost real time. On the other hand, trader is on his own. There exists no real support which trade to choose, what type of order use, etc.

When deciding what broker to choose, one must be very careful (Turek, 2008). The broker is like life partner for trader. If trader chooses carefully, no problems will occur. However, if trader chose badly, it would end up as a nightmare.

When choosing broker, trader should look on financial health, reputation and recommendations from users. Brokers may vary in quality of data provided, number of accessible markets and number of trading platforms for entering orders. Also, it is important if the broker is regulated by financial authorities or is out of regulation.

3.4.2 Trade orders

If trader wants to enter or exit the trade, he has to decide how exactly trade will be executed (Nesnidal and Podhajsky, 2005). There exits numerous amount of orders for entering and exiting the trade. The author decided to describe the basic used orders which he personally uses for trading.

- **Entry orders** - entry orders serve for entering particular trade. Basically, there are only two ways how to enter the market.
    - Market order - this order signals the broker to sell or buy (market buy/ market sell) contract at the current price. The priority is to get into the trade as soon as possible, no matter the price (Financnik, 2005). This order should be used by the trader only in most liquid markets; otherwise there is big risk of slippage (see chapter Money management).
    - Buy/Sell Limit order – the trader wants to enter the market at particular price or better (Financnik, 2005). Order can be used for long and short trades. The main priority for the trader is the price, not the time. He is able to wait for price to come to prepared level. However, sometimes the price can run away, i.e. the trade will not occur.

- **Exit orders -** orders used for exiting the open position (Financnik, 2005).
    - Market - sometimes called flatten. Buy or sell (according to the entry order). Priority is to get out of the market as soon as possible.
    - Buy/Sell Limit order – order is placed at the particular price in the market, where the trader would like to gain profit (profit target).
    - Buy/Sell Stop – price limit designated by the trader as a maximum accepted loss for the trade. If the price touches or crosses the level, the order will be automatically executed.

3.5 Software and data

Trading software is big help for each trader. Through software, the trader gets the picture how the market looks like and what should be the next trader`s move.

There exits numerous software tools which are designated to help traders to better analyze, manage and develop strategies. The software has the ability not only to create graphs of particular market, but also to back test strategies or develop new ones.

Some software is for free, but in majority the software is paid. The price for software can range from tens of dollars a month to full all life-time license costing more than thousand dollars. Almost all software creators offer trial versions of their programs to get familiarize with the software functionality.

Author decided to split this chapter into three subchapters:

- Trading platforms;
- Charting software;
- Supporting software.

3.5.1 Trading platforms

Platforms are provided by brokers, used for entering trade orders. Most of time, platform is created as multipurpose – one platform for all trading products offered by broker. This fact could sometimes lead to trader`s confusion, but the brokers always offer manual to these platforms. Broker`s platforms may vary in quality of data provided, number of accessible markets and in ability to support additional software (see Charting software). Some trading platforms are also available for mobile devices such as smartphones or tablets.

3.5.2 Charting software

Used for charting markets and conducting analysis. Most of software could be also connected to trading platforms and trades could be executed directly from the chart. Some

charting software could be used for free if serves only for paper trading and back testing. Software varies in number of accessible markets, data provided for those markets (some software provides long term historical data for back testing).

When choosing charting software, trader should choose the one most user-friendly, with variety of tools necessary for his trading style, be aware of fees for using the software and what support the developer provides for software users.

As can be seen in Appendix C, the fees could be quite different. However, the fees are always associated with how many tools has trader at disposal when using particular software. Some software, such as E-Signal is mostly used by professional traders, while Ninja Chart or Sierra Chart are used by beginners and semi-advanced traders.

3.5.3 Supporting software

Supporting software includes all tools which are used for recording, analyzing and developing strategies.

For the purpose of recording previous trades, many traders use Microsoft Excel in form of sheet, where they record most important data of each trade such as entry/exit price, number of contracts, entry/exit time, MAE, MFE, profit/loss and other important information. The software also serves for charting various curves such as equity curve[3]. Traders also use software for capturing actual screens of trades to analyze what has been done and how the trade was managed. There exist many graphic editors for capturing screens such as SnagIt, or One Note.

There is also another category of software, which serves for the purpose of developing actual and new trading strategies. The most used are Market System Analyzer and Trade Station. Software is used for automatic backtesting of discretionary and automatic strategies and also calculation of possible drawdown of system.

[3] Equity curve – Graphic representation of change in value of trading account over period of trades

3.5.4 Data

Data influence what trading strategies a trader can pursue (Financnik, 2012). Data could be obtained by the trader from several sources. First possible source is to have data already included in charting software. Many charting software providers often offer at least historical data for intraday and positional strategies. However, this data could only be used for backesting the strategies.

Second option is to open an account by broker. Brokers provide actual data which are suitable for paper trading and live trading as well.

The third and most expensive option is to buy data from third party. There exist many specialized companies offering high quality tick data for monthly fees. However, this type of data also cost about 100 and more USD per month[4]. One of the most known specialized companies is called IQ Feed.

There are basically two types of data which are available for the trading purposes:

- End-of-day - suitable for positional strategies, especially for longer term strategies (weeks, months) where is no need to monitor intraday price movements. This data could be obtained for free on many different websites such as Yahoo Finance, Barchart, and Financial Times. Also many charting software companies offer end-of-day data for free with their programs.
- Intraday – a-must-have for those traders whose strategies are based on short term positional (days) or intraday price movements. Data are often provided by brokers by who the trader opened and funded an account. However this type of data aren`t in as big quality as provide by third party companies. Intraday data could be divided into two categories:

[4] For more information, see http://www.iqfeed.net/index.cfm?displayaction=data&section=fees

- Snapshot data – data sent by broker every 2-5 seconds in bundles. They don`t offer absolutely accurate sight into bid/ask and price movement. Despite this fact, snapshot data are suitable for the majority of traders.
- Tick data - very accurate bid/ask and price movement data. Necessary for those whose strategies are built on bid/ask distribution.

3.6 Approaches to market analysis

In order to properly invest into any kind of asset, traders must perform an analysis of particular market (Nesnidal and Podhajsky, 2005). Only then a trader can take a decision whether to enter into trade or wait for another opportunity.

But it is not that simple. Trader must decide not only whether to enter / not enter, but how will he enter and consequently how will he exit the trade. To take a good decision, trader can use several techniques based on two main approaches:

- Fundamental analysis
- Technical analysis

Both of these approaches have their pros and cons, which will be described below. Author feels to emphasis, that there also exits a third "approach" called intuitive analysis. Sadly, many beginning traders tend to use this style but in amateur, inexperienced version it looks more like a gambling and not a serious business. However, many professional traders use as part of their business approach their intuition, but those people have years or even decades of real trading experience and thus can afford to include their experience into trading.

3.6.1 Fundamental analysis

Everything has inner value. That could be motto of fundamental analysis (Turek, 2008). Fundamental analysis is the oldest type of all approaches applied on markets. It is mainly used by financial experts and analysts to value the companies or commodities on the basis of internal and external factors such as turnover, profit, demand, supply, etc.

The main objective is to find assets which tend to be undervalued or overvalued and then speculate for returning to balanced state.

Analysis could be divided into three main levels:

- Global (macroeconomic) - analyse overall economic situation on national or worldwide level. The goal is to properly analyse macroeconomic indicators (inflation, capital movement, taxes, and unemployment) and adjust the strategy according to the obtained data.
- Industry – analyse specific industry, its cyclical movement, actual performance in comparison to other industries.
- Individual - analyse specific company or commodity. Analysis takes into account historical performance of the asset, demand for it, and its performance in comparison to other assets.

3.6.2 Technical analysis

Graph is the strongest tool. Traders use technical analysis on all kinds of assets whose price movement can be transferred into the chart (Nesnidal and Podhajsky, 2010).

Technical analysis deals with studying the bid/ask difference and systematically study of historical and current price movements. In contrast with fundamental analysis, technical analysis only use data created by particular market itself or intermarket correlations. For technical analysts have economical or other factors no importance, because these are already included in the graph itself. Traders using technical analysis argue, that price has already absorbed all publicly known or unknown information. The goal of analysis is to predict future price movement.

There are two basic approaches how to technically analyse graphs.

The first one is called *price action*. Price action traders only use pure price graphs without any additional indicators (Financnik, 2009). Most approaches using price action are based on trend and support/resistance identifying (see more in this chapter). This approach is also used by the author of this paper.

Second approach is to use indicators for determining price movements. The expansion of personal computers allowed the creation of specialized charting programs. Those programs use technical tools based on mathematical formulas to help the traders better forestall future market moves. Some of those tools are based on claim that market is overbought or oversold, other try to define price movement on the average price movement in the past. Because author does not use indicators in his system, they will not be described further more in the paper.

Graphs

The core of technical analysis is study the chart. Technical analysts try to with use of many different tools predict forecast price moves.

Types of graphs

The price development can be recorded by many different graphic types. The basic difference when using particular graph is from what data are they calculated – time, volume, bid/ask.

Time graphs

Data are based on time factor. Every bar could represent price move from 1 minute up to week or month, even a year. The amount of time represent in bar is called time frame. Most commonly used timeframes for intraday trading are one, two and three minute time frames.

The bars can have different visual form. The most common used graphic types of bars are:

- **Column bar** (OHLC – open, high, low, close) – column bars, by most traders known as OHLC bars are the most basic type of time graphs. Every bar represents open, high, low and close price of specific time period as can be seen in Appendix D.

- **Line** – the easiest form of time based graphs. Line graphs can represent price moves only at one specific point (usually price close). Line graphs are very easy to read for traders; however they only can represent one fourth of all price movement, what makes them not very useful in intraday trading. Appendix E represents line chart on monthly data
- **Candle stick** – also called Japanese candles by the country of origin. The most used type of time based graphs and also most suitable for intraday trading purposes (Brooks, 2012a). The candle is very easy to interpret and trader sees very clearly the whole price movement during specific time frame. This type of graph is also used by the author. Let's look closer how to read this type of graph (Appendix F):
    - The body – on the picture above can be also seen as full filling, called "real body". The colour (depends on the trader`s preferences) signal whether the price made during specific time period up/down movement. On the picture above, blue represent up movement and red down price movement. The real body defines the range between opening and closing price.

      The blue body represents up price movement. The open price was lower than close price. The vice versa is applied for red candle.
    - The shadow – very interesting and crucial part of candlestick graphs. The shadows (upper/lower) are representing highs and lows of each movement during specific time period. Traders use the shadows of candle stick bars for determining the price exhaustion. This could mean the trend reversal or pullback.

Swing

The price tends to move in waves. It doesn`t happen very often to see price moving sharply only in one direction (Brooks, 2012c). Even then, if there is longer price movement, e.g.

uptrend, there are also appearing countermoves in the main price movement. The countermoves are called swings.

The swing is one of fundamental factors of technical analysis and one of the most visible. The swings determine, whether the price tends to move in a trend or chops. Also, swings could determine if trend is at the peak/bottom of its potential and could signal trend reversal (Brooks, 2012a).

To properly identify swings in the graphs, the trader must set up specific conditions when price bars create the swing. The conditions for swing designation are described as follows:

- Swing creating price peak – there must be two consecutive bars with higher close, higher low and higher high following by two consecutive bars with lower close, lower high and lower low.
- Swing creating price bottom - there must be two consecutive bars with lower close, lower high and lower low following by two consecutive bars with higher close, higher low and higher high.

Appendix G represents swings on e-mini S&P 500 chart.

Trend

Trend is your friend - old motto used by many skilled traders.

The price tends to move to one specific direction for longer period of time with bigger and smaller price corrections (Brooks, 2012b). These periods are called trend. There are of course periods of time, when price tends to stagnate, i.e. moves to the side or chops.

The length of trend is dependent on the time frame the trader has chosen. There are trends on daily, weekly or monthly charts which last for weeks, months or even years. These

trends are called “longer trends”. Those are semi-important for intraday traders. All those trends can be seen in Appendix H.

Far important for intraday trader are trends on 30, 15, 5 or lower minutes bars (Appendix I). Intraday traders usually use 5 and fewer minutes time frames to enter and exit the market, the main and important trend are then identified on above described time frames.

How to identify trends?

Price not always tends to move in specific direction. Sometimes, price chops, i.e. moves sideways. It is crucial for intraday trader to identify price movement. It is much easier to trade with than against the trend.

For correct trend identification, trader can use price action approach or indicator based approach.

- **Price action approach** – this method is more experienced demanding, however also quicker reflects the change of situation in the graph. The core of technique is to use swings for determining where the price leads.

  Uptrend could be define as when swing, whose high is higher than high of previous swing and in the same time, its low is higher than low of previous swing. If this constellation is seen first time after longer period of time, it could indicate the beginning of uptrend. If trader can spot more swings in a row, it indicates continuous uptrend. Uptrend is interrupted; when low of current swing is lower that low of previous swing.

  Downtrend is set when swing, whose low is lower than low of previous swing and its high, is lower than high of previous swing is spotted. Downtrend is interrupted, when high of current swing is higher that high of previous swing.
- **Indicator based approach** - for trend identification, trader can use specific indicators. Indicators used by majority of traders are moving averages. They are

very easy to use and are less experienced demanding as price action. However, indicators in general only reflect past time, i.e. what can already be seen in the graph. Because author does not use indicators in his system, they will not be described further more in the paper.

Support and resistance levels (S/R)

Sometimes, price tends to stop or slow at the specific levels or even reverse. These levels are often places, where the price stopped/reversed in the past and traders consider them as important. They are called support/resistance. There exist two types:

- **Support** - price level in the graph, where selling traders refused to sell for lower price or buying traders started aggressively buy, because they considered price cheap.
- **Resistance** – price level, where buying traders refused to buy more contracts and selling traders started to sell, because they considered price to be too high.

S/R can be used as levels where price can stop or revers and use this advantage to trader`s benefit.

The use of S/R is based on its basic properties:

- S/R levels tends to repeat on the same price levels as in the past – where market had significant problem to cross price level, this could be also expected to happen in the future.
- Supports change to resistances and vice versa – if the price served as resistance in the past, it could after crossing serve as support.
- Strong S/Rs have the tendency to hold the price – it is wiser to speculate on the price rebound than price break out.

The appendix J shows support and resistance levels on weekly graph

The intraday trader should analyse main S/Rs on 15/30 minute timeframes, and these should serve as entry/exit points of trades. There are also other points, which can serve as a weaker S/R such as high/low of previous day, high/low of current day, etc.

Correct identification of S/Rs is based to some extend on subjectivity and trader`s experience.

Price patterns

Price patterns represent graphic formations on the graph. These formations offer traders all necessary information whether to trade or stay out of the market. Price patterns are the basic building stone for most trading systems. Some traders combine patterns with indicators as well.

For the purpose of this paper, pure price action will be described. Price action is based only on using price graphs without any additional indicators. Here are described basic patterns used by the author:

Intermarket divergences

Intermarket divergences are price patterns whose occur when there is price deformation (difference) between monitoring markets (Futuresmag, 2010). Intermarket divergences pattern represent counter-trend pattern.

The intermarket divergences must be only used on strongly correlated markets. The markets for intermarket divergences are three out of four most known US stock indices. It is e-mini S&P 500(ES), NASDAQ 100(NQ) and Dow Jones Industrial Average (YM). Appendix K confirms, there is strong correlation factor between the markets described above. Intermarket divergences signal possible trend pullback or reversal. The most usual

form of pattern can be seen, when two of three markets are not able to make new high/low (depends, whether price is moving up/down) and the third one is able to create new high. Appendix L shows the basic concept of intermarket divergences.

Flip - sometimes called role reversal. Flip represents a trend pattern. The basic concept is that strong resistance levels tend to role reverse and become supports and vice versa. The price must break through strong S/Rs in order to role reverse as can be seen in Appendix M..

Volume and range

Volume and range should be key factors and every intraday trader should pay attention to these indicators (Elder, 1993). They bring key information such as whether the best time to trade is or how big price movement can be expected during trading session.

Volume – by some traders designated as indicator, despite the fact it is not based on any mathematical pattern, only serves for monitoring how many contracts have been traded during specific time period. The higher the number is the more trades have been done.

The basic use of volume for intraday trading is to determine, whether particular market is suitable for intraday trading or not. Intraday traders tend to go only for small profits; there must be a big volume in order not to get a big slippage (price different between entry price trader requested and real entry price).

Range (volatility) – range represents the average price movement during specific time period from low to high. This information serves as one of key factors when deciding which market to trade.

The bigger the volatility is the more the price will have the tendency to move. This could bring bigger profit for trader, however the bigger the price movement is, the more capital is required for trading particular market.

The volatility has the tendency to change during, e.g. calendar year with periods of bigger and periods of lesser price volatility. This must trader also take into account when building intraday strategy.

The range could be identified by simply looking at the charts to see how big the average bars are or by using mathematical approach.

The formula to calculate daily price movement is: *high of the day – low of the day.*

The result represents the max price movement the market was able to do during day.

3.7 Money management

Solid money management makes an average trading system a great system (Turek, 2008). Also, the same can be said about poor money management and great trading strategy.

The basic premise of money management is fact that trading strategy should have positive risk to return ratio (Nesnidal, Podhajsky, 2005). This means, that trader should never risk more than the potential profit from trade is.

Money management helps trader to stay in the market and not completely wipe out his account in few trades. The basic motto Elder (2010, p. 283) mentioned about money management is: "*Never ever risk the whole account*." Sadly, many beginning traders underestimate the value of truly good money management. This fact also confirms Rogers (2008).

In order to be sustainably profitable trader, trader must accept the fact that trading is the game of statistical probabilities (Douglas, 2010). Trading business is about probabilities. Period. There is no holy grail in patterns or fundaments, which will be successful in 100% of trades. There will always be unsuccessful trades and trader must be prepared for this.

Then how to prepare? The main edge among the biggest traders is good money management. The first thing is to survive. Trader must avoid risking more than he can afford and also must survive long enough to get enough experience in markets to become profitable (Elder, 1993). Beginner in financial speculations cannot expect to become millionaire in his first year. Yes, there are some exceptions, but the average beginner will be happy to survive for first couple of months and not end with wiped account. The most traders bankrupt when they try to gain back the money they lost. They speculate with more and more money after every failed trade than their account can sustain and in the end it leads to complete account erasing.

From the above stated, the responsible trader must ask himself what is the optimal amount to risk per trade.

Many authors such as Nesnidal and Podhajsky (2005) recommend to risk at max 5% of trader`s account per one trade. However, other authors such as Douglas (2010) recommend for intraday strategies only 2-3% depending on the amount of money trader possess. This statement also confirms Elder (1993, p. 285) who says "*a long term research showed that to be sustainably profitable intraday trader, one must risk no more than 2% of account."*

As can be seen from above stated, the real "*holy grail*" in trading lies in proper application of money management. In the next paragraphs, author will describe the basic tools used in money management.

3.7.1 Money management tools

Money management is not only about risking a specific amount of money, but it also serves for tracking how profitable trader is and how successful his trading strategy is in terms of entries and exits. Also, money management covers the specific but key part of profitable trader`s strategy – position sizing. Let`s describe the basic tools used in money management:

MAE/MFE analysis

MAE (maximum adverse excursion) – MAE analysis shows trader the maximum loss of each trade since the entry. In other words, MAE represents the maximum drawdown of the trade. It is the basis for determining the amount of stop loss.

MFE (maximum favorable excursion) – MFE represents the maximum profit of each trade. It helps trader to determine optimal profit target for each trade.

MAE and MFE analysis are necessary tools for properly set the amount of money needed to risk and money to expect. This state is confirmed also by Maschke(2012) who states that MAE/MFE are cornerstones when building any trading system.

Profit Target (PT)

According to Financnik (2009a), profit target is price, where trader decides to exit the trade with profit. As will be described later in this chapter, profit target should always be at least 1:1 with the risk, i.e. when trader risk 100 per trader, profit target should be 100 USD as well. However, many author such as Turek(2008) and Dvorak et. al.(2008) claim that optimal risk to return should be at least 1:2 and should also reflect win/loss ratio (see further in this chapter).

Stop-Loss (SL)

Risk or stop-loss has to be defined well before trade begins (Nesnidal and Podhajsky, 2005). The average stop-loss is known through MAE analysis. However, trader also has to take into account not only the average MAE but also whether the average MAE is within limits of 2-3% risk per trade as described by Douglas(2010) and Elder(2006) in the beginning of this chapter.

Win/Loss Ratio (Win %)

The indicator represents a ratio between all successful and unsuccessful traders. It does not take into account, how big the profit or loss was. Win% only shows whether it was profitable or losing trade (Milton, 2013).

The formula is: *(win trades / loss trades)*100%*

The lower the final percentage is, less successful the system is in terms of win to loss trades. However this number does not represent whether the system is profitable or not. For specifying system`s profitability, another tool must be used.

Risk/Reward Ratio (RRR)

Risk/Reward ratio is used for comparing the expected profit to expected loss. Therefore, it is composition of two parameters. The first is risk or stop-loss (see chapter Money management tools), second is profit (see chapter Money management tools). Many authors such as Dvorak et.al.(2008), Turek(2008) and Williams(2007) state that RRR should always be positive with ratio of at least 1:2, optimal 1:3.

The formula is according to Pendergraft (2010): *expected risk/expected profit (must be calculated in currency or point move)*

System`s profitability

It is not basic tool of money management, however author decided to add this paragraph in order to demonstrate how to calculate system`s profitability. Author also considers this paragraph as crucial for determining whether the system could be profitable in live trading or not.

There were described two tools (Win% and RRR) needed for obtaining the results.

Let`s demonstrate how to calculate profitability.

Trader has conducted the backtest of his system on historical data. The Win% is 40% and RRR is in average 1:2. The backtest was conducted on 100 trades. That means, 40 trades were successful and reached our profit target and 60 trades hit stop-loss. The average stop-loss was 100 USD and profit target was 200 USD.

The formula for calculation of profitability is as follows: *number of successful trades * profit target – number of losing trades * stop-loss.*

That means: 40 * 200 – 60 * 100 = 2000 USD. The system generated after 100 trades 2000 USD profit, what represents 20 USD per one trade.

Appendix N summarizes the profitability calculation in sheet form.

Position sizing

Positions sizing makes the average system a profitable one (Dvorak et.al. 2008). The prerequisite for solid position sizing is fact, that system must have positive risk/reward ratio. If this is true, then position sizing can significantly reduce risk and in the same time exponentially increase trader`s profits.

According to Nesnidal and Podhajsky(2013), there exists two basic approaches in position sizing:

- martiangle,
- antimartiangle.

Martiangle

Martiangle position sizing is built on premise that a losing traders should with each consecutive lost trade increase number of position in next trade. This approach was adapted from casino games such as roulette. However author such as Nesnidal and Podhajsky(2013) and Dvorak et.al.(2008) consider this approach as pure nonsense. There is really no value in adding more contracts per each losing trade, because it destroys primary purpose of money management, i.e. keep trader away from extreme risk which could lead to erasing of account.

Antimartiangle

Antimartiangle approach is based on absolutely opposite approach – to add more contracts per trade as trader becomes more profitable. If trader`s account tends to increase, traders adds more and more contracts. When there is losing period of trades, trader lowers amount of positions per trade. Antimartiangle has 5 models, which trader can apply (Nesnidal and Podhajsky, 2013):

- **Fixed fractional (fixed risk) –** the very basic approach to positions sizing, suitable for smaller and bigger accounts as well. Trader has to define the amount of percentage of risk per trade and also the amount of risk per whole account (in %).
  The formula is as follows:
  K = Ac*(Pr/100)/R1max
  K – number of contracts
  Ac – the size of trading account
  Pr – risk percentage per trade
  R1max – maximum risk per one trade
  Example: *Trading account has size of 10000 USD. The riks per account is 2%. Average stop-loss is 100 USD. Then result is - 10000*(2%*100)/100 = 2 contracts*

- **Units per fixed amount of money (UPFA)** – trader has to define, how much money he will use per contract.
  Example: *Let`s say that starting account is 5000 USD. It is tiny amount, however it is sufficient for less expensive markets such as e-mini Nasdaq 100 and e-mini Dow Jones. That means, that every 5000 USD can trader add one more contract. If he will be successful, then at 1000 USD he will trade with two contracts and so on.*

- **Equal units model (EUM) –** used mostly at stock trading, however author will describe this approach as well.

  Example: *Starting account is 10000 USD. Trader would like to buy 5 different stocks and at the same time keep risk for each stock at the same level. Thus, he has to split account into five equal parts (2000 USD) and buy stocks. Because stocks have different value, he will obtain different amount of stocks per each part.*

  Model can be also applied to commodities with some adjustments. The biggest difference is fact, that in commodities, trader cannot risk whole account at the moment, thus the amount for splitting will be lower.

- **Percentage of margin (POM)** – the basic rule is to open as many positions per amount of margin as possible.

  Example: *The account has 30000 USD. Trader decides to risk maximum 3% per trade, what represents 900 USD. If margin for one position is 500 USD, the trader can open one position at the time. If margin is only 400 USD, trader can open 2 positions simultaneously.*

- **Percent Volatility Model (PVM)** – based on volatility, the amount of positions is reflecting current volatility at the market. To measure the volatility, trader can use volatility indicators such as Average True Range (ATR) indicator or Price Action (PA).

  Example: *Account has 30000 USD. Trader decides to risk maximum 3% per trade, what represents 900 USD. ATR for e-mini S&P 500 is 300 per day, thus trader can open 3 positions per trade (900 / 300 =3). If ATR is 500 USD, then only one position is allowed.*

As you can see, there are numerous ways how to approach position sizing. Trader can choose just one method or combine several into one. It is completely up to him. However, it is important to use some.

Drawdown

Drawdown reflects the maximum retracement or decline on the trader`s account during specific period of time. Drawdown is usually measured as the percentage between the peak and the trough.

Slippage

The difference between expected and real price the trade was executed for. The slippage mostly occurs during higher volatility, or when there is low volatility in particular market.

4. Problem Analysis and Current Situation

Analytical part will be describing current situation of author's day trading strategy. The whole chapter will be divided into two main parts.

First part will be focused on system`s testing on historical data – back testing and its optimization with use of money management. Also, this part will serve for describing what patterns, when and how the author trades, what software he uses for trading, recording and testing and what markets author trades.

Second part will be aimed at paper trading – trading in real environment, however only with fictional money. This part is by author`s consideration the real key for successful trading, much more than back testing. Author will be talking about this later in the chapter. Also one crucial change happened during transition between back testing and paper trading and this will be also mentioned. Great focus will be dedicated to psychology, because this has showed as very, maybe the most important part of the whole system.

4.1 Back testing

First few paragraphs of this chapter will be aimed at description of software the author uses for trading, such as the broker, charting software, recording software, etc. Then will be described the idea of strategy with its price patterns and other tools used for the strategy. The final part of chapter will describe how the back test was conducted, what were the results, what if any changes were made in the strategy and the recommendations for paper trading.

4.1.1 Broker and software

Some could argue, that to choose a broker before the back testing even began is pure nonsense. However, the author feels it other way. Especially, it is necessary to choose or at least to have a pool of possible brokers trader would like to use during paper and eventually live trading because of one important thing – commissions. Commissions among slippage are factor which could really influence system`s profitability as was mentioned in chapter Brokers and trade orders. If the commissions are too high, system must be adjusted to this fact, otherwise all trader`s profit will consume commissions. Commissions are composed by two parts and those are paid separately. One half is paid right after the trade is opened, second after trade is closed. Together, they are called round turn (RT). The RT for US e-mini indices is 4.02 USD, what is more than comfortable fee (Interactive Brokers, 2013a). There is also the possibility to lower the fee if trader exceeds specific amount of trades per month, however this is not actual for the moment.

As was mentioned before, there exist numerous amounts of brokers who offer they services. The broker author has chosen is the one the author also uses for other non-day trading strategies. This broker is also one of the cheapest in terms of commissions and has also one of the best reputations in US and worldwide market.

The broker`s name is Interactive Brokers. It is online category broker based in United States with history longer than 30 years. The broker is the most awarded broker in last 5-10

years in terms of customer satisfaction and reliability (Interactive Brokers, 2013b). Also its financial health is to be considered more than average and its financial rating is by Standard & Poor`s A-/A-2 with stable outlook (Interactivebrokers.com, 2013c).

Also one of important factors is its user-friendly trading platform with its multipurpose use. As was mentioned above, the author also use broker for other live trading strategies and thus there was no need to learn how to command the platform. Platform can support various charting software such as one the author uses and the trades can be managed from the graph itself.

The charting software

Charting software is crucial part of every trader`s equipment. Charting software serves as primary source of information for all technical traders.

As was mentioned in chapter Software and data, there exist numerous software solutions for intraday trading. Author has decided after testing several software programs such as Ninja Trader, Gecko TnT and Sierra Chart to pick up the last mentioned. The program offers all necessary tools the author requires and its pricing is also more than suitable. The program also has the ability to execute orders directly from graph, which is also a plus.

The average costs for the software are 50 USD/month.

The supporting software

For the purpose of trade recording, two software solutions will be used. First is the notorious known Microsoft Excel, which will serve as a trade book, where all necessary data will be stored, such as price of entry, number of contracts, date of entry, time of entry, exit price, profit/loss, MAE and MFE. Also, Excel serves for mathematical calculations, such as equity curve or MAE/MFE analysis.

Next software used for recording is called One Note. One Note serves as notebook, where author puts notes and screens of all trades. There are always two screens, one of 30 min. time frame, another of 3 minute time frame and associated notes, such as where and why the enter was made, how trade was managed and where the trade was ended.

4.1.2 Traded markets

The markets used for back testing and consecutively for paper trading were chosen according to the recommendations of one senior trader and also due to expected amount of trading account. Only one market was used for back testing – e-mini S&P 500.

S&P 500 is one of four main US stock indices. E-mini S&P 500 is reduction of standard S&P 500 in a ratio of 1:5. The ticker for e-mini S&P 500 is ES. ES represents the most liquid stock index in the world, with more than 1.2 million traded contracts per day (see chapter Futures and futures exchanges).

The minimum price move or one tick is 12.5 USD. The full point has value of 50 USD and is composed by 4 ticks, with value of 0.25 point each.

This market is considered less aggressive, very suitable for counter-trend strategies. It also respects historical support/resistance levels what is another plus for this market.

The average range of ES is very dependent on the period of year. In less liquid months such as August or December, the average daily price movement is around 15 points, what represents 750 USD. In more liquid months such as May, June, July or September, the average daily price movement is 20-24 points, i.e. 1000-1200 USD. Appendix O shows this fact through chart on e-mini S&P 500, April – August 2013 period.

4.1.3 Fundamental reports

Fundamental reports have in some cases drastic impact on how markets behave before and mainly right after they are announced.

Author does not take into account fundamental reports when predicting future price movements, but they must be taken when deciding whether to trade or not. They can drastically influence the course of price and thus author has to know, when the most influential fundamentals are being announced.

For this purpose, author uses specialized calendar with schedule of major fundamentals for particular day and week. There exists numerous providers of calendar, the author uses website called Forexfactory.com.

Figure 1: Fundamental reports calendar - 16.8.2013

Aug 16, 2013 — Up Next

Date	4:57	Currency	Impact		Detail	Actual	Forecast	Previous	Graph
Fri Aug 16	7:30	USD		Building Permits		0.94M	0.95M	0.92M	
		USD		Housing Starts		0.90M	0.91M	0.85M	
		USD		Prelim Nonfarm Productivity q/q		0.9%	0.5%	0.5%	
		USD		Prelim Unit Labor Costs q/q		1.4%	1.4%	-4.3%	
	8:55	USD		Prelim UoM Consumer Sentiment		80.0	85.6	85.1	
		USD		Prelim UoM Inflation Expectations		3.1%		3.1%	

Source: Forexfactory.com

Author only focuses on red and orange reports as these have the most impact on the market.

4.1.4 Trading hours

In order to be most successful in intraday trading, trader has to trade when there is the most liquidity in markets.

It is possible, in theory, to trade in any time, but there is minimum to none liquidity in premarket or aftermarket[5] . The most liquidity is concentered into regular trading hours (RTH). ES`s RTH is from 8.30 a.m. central standard time (CST) to 15.30 p.m. CST. However, there are more liquid hours in RTH and less. The most liquid hours in RTH are right after open, i.e. 8.30 a.m. – 10 a.m. and then 14 p.m. – 15 p.m.

This also confirms Appendix P, where can be seen on time period of five trading days (12.8.-14.8.2013) how liquidity changes in time. The most liquid periods of day are from opening of RTH to 17.00 – 17.30. Then liquidity drastically drops due to lunch time in United States. And again liquidity rises in the evening period from 20.00 – 22.00 CET.

[5] premarket/aftermarket is period of day out of regular trading hours

4.1.5 Trading strategy

This chapter will firstly describe the basic idea of author`s strategy. Then author will focus on how to identify key points in the market, main support/resistance levels, what tools he uses for S/R levels identification and will describe the principle of which S/R to use and why.

Then, author will describe price patterns which are used for entering the trade. Exit techniques will be also described later in the chapter after conducting MAE/MFE analysis. The outputs of this chapter will serve as starting point for paper trading.

The idea of trading strategy

The idea is to trade stock indices which tend to strongly correlate. The correlation was demonstrated in chapter Approaches to market analysis.

How can correlation be useful for trading strategy? Because stock indices have strong ties between each other, the trader can use this correlation for forecasting future price movements in particular stock indices. There is an effect called *leading-following*, what means, that there is always one or more markets which signal possible price movement and in the same time, there is/are market/s which is/are lagging, e.g. they are following. When this situation occurs, price patterns such as intermarket divergences or flips occur. However, this process cannot be applied mechanically e.g. trading only pure price patterns wherever in the graph. These price patterns must be traded only in price levels, where is big possibility, that price will reverse or will break out. For this purpose, first step in trading strategy is to properly identify strong S/R levels.

S/R identification process

The basic concept of S/R levels were mentioned in chapter Technical analysis. This chapter will practically demonstrate how author looks for strong S/R levels in the graph.

For the intraday purposes, author primarily uses for S/R identification 30 minutes time frame. It is due to the fact, that 30 minute TF offers intraday trader solid overall overview what happened not only few minutes back, but also what happened yesterday or last weeks. Strong historical S/R levels tend to repeat at particular price levels and these levels are better seen from bigger time frames.

Let's demonstrate on the graph how to identify strong S/R levels. For this purpose, author will use 30 min TF for ES market from 22.7. to 15.8. 2013.

As can be seen in Appendix Q, price tends to move in trading ranges (white broad zones). The ranges could more or less broad. The highs and lows of these ranges form the strongest S/R levels. The strongest S/R levels are shown as green rectangles on the figure.

The more times the price touches specific price level and bounces off back to trading range, the more stronger the S/R is. However, what has to be emphasized is fact, that price will one eventually break out every, even the strongest S/R and will move out of trading range. Then price will be in trend and price will have the tendency to look for another trading range, where will settle for some time. This can take one day or even several weeks, but in the end, price will again settle in trading range. This can also be seen on the figure as price breaks out of trading ranges and moves to another price levels, where again settles.

What is also important to mention, that S/R levels tend to repeat. Traders remember important price levels, where price stopped or changed its course in the past. Some are demonstrated in Appendix Q.

However, this is not the whole process. The next step lies in applying **a volume profile** tool. Volume profile represents a study applied on the price graph and shows how much volume has been trade on particular price level. The origin of study comes from classic volume indicator; however volume profile does not take into account time but price movements. Let`s apply the volume profile on the same figure as above.

The volume profile has been applied on the same trading ranges as they were designated in figure twelve. The basic idea is to look for trading ranges where the most contracts have been traded in the middle of the range. The pink line in each volume profile represents price level, where most contracts have been made. This is called point of control or POC.

As can be seen in Appendix R, trading ranges number 2, 3 and 4 have their POC in the middle and thus are very suitable for the application of author`s strategy.

Now, when the trading ranges with suitable POCs have been identified, trader can start to look for price patterns based on intermarket analysis.

Price patterns

Price patterns are created on the basis of intermarket correlations. As was described in chapter Approaches to market analysis, author uses two following patterns:

- **intermarket divergences;**
- **flips**.

The main time frame at which to look for price patterns is 3 min time frame. This is the most used TF for many intraday traders, as it offers good ratio between the rendering speed of each bar and the time to make decisions. Sometimes author prefers to use 2 min TF, especially during periods with lower volatility, such as summer holidays or pre-Christmas time, when there is significant drop of volatility in the markets.

Intermarket divergences – they are mostly used when there was identified trading range and the trader speculate for price reversal at the edges of trading range on strong S/R zones. For intermarket divergences, trader must choose markets with strong correlations. One market serves as primary (the market trader trades) and the other two serve as supporting, i.e. they help to confirm divergences or flips.

The situation can look as follows. There is strong S/R zone (red rectangle) at the edge of trading range. ES creates lower low (blue line), while another two markets (e-mini Dow Jones and Nasdaq 100) were not able to create lower low, instead they created higher low. This is the optimal situation, when author starts to look for entry point. The entry is confirmed, when there are following two bars with higher close than the close of divergence pattern.

The basic stop-loss is calculated from MAE/MFE analysis (will be described later in this chapter), but author does not often use full stop-loss. He prefers to use stop-loss based on

price action and thus the stop-loss would be one tick under the low of first bar with higher close.

However, as all patterns, divergences have also some limitations and these must be taken into account when applying them.

The first and by author opinion the hardest for beginning traders is fact that divergences do not occur every hour, sometimes even days. Trader must be patience and wait for his opportunity. It will be described later in the chapter about paper trading, but the similar has happened to author when paper trading started. He entered into trades which had nothing in common with divergences because as many beginners, he wanted to trade.

Second limitation lies in applying divergences. As was already mentioned, pattern cannot be mechanically applied wherever in the graph. It must only be in predefined trading ranges, especially on its edges where the statistical probability is in favor of trader.

Third limitation lies in how pattern is rendered. Sometimes trader will spot clear divergence, when primary market where trader would like to trade makes divergence with lower low and other two creating higher low on the second angle. But sometimes, trader can spot divergence, when primary market creates double bottom (both angles at the same level) and supporting markets creating higher lows or primary market is creating lower low but one of the supporting markets is creating lower low too. Then trader must decide whether he will wait for perfect setup or he will trade these less strong situations.

Appendix S demonstrates practically, how intermarket divergences look like.

Flips – this price pattern mostly occur during high volatile, trending days. It is applied, when price tends to break out of trading range, usually during days when important macroeconomic data are announced.

The idea is to use predefined S/R levels. Trader will not use them for bouncing and trading back into the range, but will wait for break out of range and retest of the zone from the other side. The theoretical principle was described in detail in chapter Technical analysis.

The practical example can be seen in Appendix T.

The flip takes places in yellow circle. Price has made break out of previous trading range downwards through strong S/R level. Right after the break out, prices tries to retest the S/R level from the other side, what can be considered as flip pattern. However, this is the 30 min TF, and thus this timeframe is not suitable for entering into trades themselves. As was mentioned before, author`s main TF for entering trades is 2/3 min. There are two particular possibilities which can occur on that particular TF.

The first possibility is intermarket divergences. They can occur even in strong trending days. The situation could happen as follows:

Price would break out from previous trading range through strong S/R level as can be seen in Appendix T. Then the price would still move in the direction of break out and will not retest S/R level right after break out. This could take two/three bars in 30 min TF. Then price would start to retest S/R level from opposite side and that is time for trader to switch into 2/3 min TF, and look for intermarket divergences. Intermarket divergences are as said before price reversal (counter-trend) pattern but this time, they can be used in form of trend pattern, because the main trend on 30 min TF is downtrend and on 3 min TF trader speculate to the same direction.

The figure shows clearly how intermarket divergences can be used even for trending speculations. The biggest plus for using divergences even in trending days is fact they are very risk limited due to fact, that trader does not speculate on the original break out of trading range, but waits till the price accepts the breaking and only then looks for possible entry situations. This type of trades also offer very solid risk/reward ratio and can be performed with more contracts.

Figure 2: Intermarket divergences in trending days, 2 min TF, 6.8.2013

Source: Author

The second option when trading flips is to looks for "*smaller*" flips on 2/3 min time frames. These are quite rare situations, but are very strong.

The usual situation looks as follows: The price breaks out trading range and right after breaking tries to retest the S/R level. Only primary market`s price was able to retest the zone, the other two market`s price was significantly lower or at least one of the markets` price is lower.

However, as can be seen in Appendix U, the price tries to retest the S/R level right in it and thus this situation is quite hard to assess. One of supporting markets; in this case e-mini Nasdaq 100 has its price significantly lower below flip zone. But the second support market, e-mini Dow Jones is retesting the flip zone.

Flips are more aggressive patterns in nature and this also confirmed in Appendix U. The great advantage of flips lies in superb risk/reward ratio with small stop-loss and big profit target. The profit from particular situation described above would be 5 points (250 USD) while risk is only 1-1.5 point (50-75 USD) what gives RRR 1:5.

On the other hand, flips are very rare occasion and sometimes quite risky. Also markets must be trending. Flips have small to no use when markets are moving in trading ranges.

Flips are good add to portfolio of patterns, but it is the less favorable pattern used by the author.

4.1.6 MAE/MFE analysis

After the trader has defined what he wants to trade, which strategy and patterns he will apply, next step is to test system on historical data.

MAE/MFE analysis forms a key part of whole backtesting process. Trading system is applied on historical intraday data, at least six months period is required.

How the MAE/MFE analysis is conducted and what are the purposes? The process of obtaining data is quite time demanding, because trader must apply his strategy day by day on historical intraday charts and look for possible entry points. It is also recommended to not reveal whole trading day in advance, but reveal only one bar at the time.

The purpose of analysis is to look for predefined price patterns of trader`s strategy. After trade entry has been identified, it is important to obtain what was maximum positive price movement (MFE) and maximum negative movement against opened position (MAE). This is needed to do on the sample at least 40-60 trades in different time periods of year, because as written before, markets have higher and lower volatility during the calendar year.

MAE/MFE analysis also serves as building stone for specifying how big the profit target will be and what is the optimal risk per trade, thus it will give trader what are exit options for each pattern. This analysis will be processed in Excel and optimize on equity curve.

Also the backtest offers trader preliminary insight how big drawdown, win to loose ratio, frequency of trades and profit will be.

The results of MAE/MFE analysis

Analysis was conducted on the sample of 44 trades from June 2012 until January 2013. The months were chosen according to fact, that June and July 2012 offered significant volatility and in the same time August 2012 and January 2013 offered very small price movements.

Appendix V shows all trades recorded into excel sheet with basic information about every trade.

What does this table tells us about the system`s profitability? Actually, they have no real added value in term of system`s Win%, Drawdown or profit. The results only tells us that patterns, especially flip pattern does not occur too often, as was described in previous paragraphs. Also, the overall frequency of trades is very dependent on volatility.

Most trades have been made in June and July 2012, very small portion in August 2012 and January 2013, when only one trade entry occurred!

What can be caused of this? The first and most obvious reason is fact, that system only operates with two patterns and thus trader must be very patience to wait for proper set up in order to execute proper entry. This can caused a problem for novice trader and author has to prepare for this fact.

What is also clearly from the table is fact that almost half the trades, specifically 21 out of 44 trades have been conducted after most liquid trading hours. This has to be taken into account and strategy must be adjusted to this or if trader wants to trade only in liquid hours, he must accept that fact there will be significant less trading opportunities.

The table also tells trader that half the trades were on the short and second half on the long side, what is all right, because system does not prefer one direction.

The next step after obtaining MAE/MFE data is to process them in order to give trader results, especially whether system is profitable or not and what the win to loose ratio is.

For this purpose serves another tool in trading journal, called equity curve. Equity curve serves as main indicator whether trader`s strategy is profitable or not. All traders want to have equity curve steadily growing without extreme peaks and bottoms.

Trader must define optimal profit target and stop-loss in order to gain necessary results. According to MAE/MFE, author has some ideas about the amount of stop-loss and profit target. Author also wants to respect risk/reward ratio at least 1:2 for 1 contract. Risk must be maximally of 3% of the whole account per trade. The starting equity is 5000 US dollars. Also must be respected the fact, that each pattern requires its own analysis.

For the intermarket divergences, author has three possible profit target and stop-loss scenarios, each point is 4 ticks in ES and full point represents 50 USD:

1. scenario:
    - stop–loss – 2 points
    - profit target – 5 points
2. scenario:
    - stop-loss – 2.5 points
    - profit target – 6 points
3. scenario:
    - stop-loss – 3 points
    - profit target – 7 points

The results for the first scenario are stated in Appendix W.

There were 20 trades conducted, with Win% of 60% what is more than optimal. The average profit was 246 USD in comparison to average loss of -104 USD, what gives RRR 1: 2.3.

The very important factors - average trade and drawdown are both more than satisfying.

The equity has stable steady growth and net profit is more than 2000 US dollars, e.g. 40% net profit. The commissions are calculated already into the results.

The results for the second scenario are in Appendix X.

The system`s performance has worsened in some factors such as drawdown and Win%, but on the other hand the average profit profit has risen for 50 USD. The equity curve stays almost identical.

However, the first system still offers better results with less risk, what is more favorable for the author, than bigger average profit.

The results for the third scenario can be found in Appendix Y.

The third scenario offers drastically different and the worst results of all scenarios. All stats have dropped significantly and system is in loss. Thus, the first scenario will be applied on pattern intermarket divergences as it offers best statistics, especially risk to reward ratio and drawdown parameter.

For the flips, author has three possible profit target and stop-loss scenarios.

1. scenario:
    - stop–loss – 2 points
    - profit target – 4 points
2. scenario:
    - stop–loss – 1 points
    - profit target – 2 points
3. scenario:
    - stop–loss – 1.5 points
    - profit target – 3 points

The results for the first scenario are in Appendix Z.

Twenty trades have been conducted, with Win% of 55%. The average profit is 195 USD and risk -104 USD, what gives RRR 1.85 including commissions. The drawdown is at acceptable level of 6.24% of equity. The net profit for this scenario is 24.4% from starting equity.

The results for the second scenario are shown in Appendix A1.

The results of pattern has dropped significantly, it can be clearly seen on equity curve with its peaks and bottoms. The profit of system dropped for more than 1000 USD what is 90%. However; it is still profitable system, what can be considered as only plus of this scenario.

Also the Win% has worsened and thus this option is not suitable at the moment for paper trading.

The results for the third scenario are in Appendix B1.

The third scenario offers positive results, even better than the second one, however still not as good as first flip scenario. The biggest problem lies in distribution of profit.
This can be seen on equity chart, where there are strong peaks and bottoms. This is not the optimal distribution, because as said, trader primary looks for stable income, i.e. stable equity growth. Thus the first option is to be considered as best for flip pattern.

4.1.7 The results of back testing and recommendations for paper trading

When all patterns have been tested and the most suitable scenarios have been chosen, it is time to connect all patterns into one equity curve and see what results the back test offers.

For intermarket divergence, author will use first scenario. Same applies for flip pattern.

The overall results look quite promising (see more in Appendix C1). The net profit for tested period is almost 3340 USD, what represents the return of 66.8% of initial capital.

The Win% is 57.5%, what is more than enough for any intraday system.

Risk to reward ratio is 1:2.1, what is also optimal parameter for intraday system.

The drawdown is at acceptable level of 10.4 percent.

The equity curve offers stable growth, without significant peaks or bottoms in its distribution.

The author sees the biggest problem in the frequency of trades. Some periods of back testing were without single opportunity for more than a week and there is risk of entering trades which are not in trader`s favor. This links to other aspects of psychology as this cannot be trained during back testing and thus is the biggest unknown for upcoming paper trading.

As for recommendations, it is recommended to trade both patterns. Intermarket divergences are more suitable, when market is moving in trading ranges, while flips tend to occur and are mostly successful, when market is trending.

It is important to only enter trades, while they occur on the edges of trading ranges, not in the middle of nowhere. Trades on the edges have the best probability for success.

Trader must respect parameters of researched stop-loss and profit target. The maximum risk is set for 2 points for both patterns, what is 2% of whole account. This must not be violated.

It is crucial to take only opportunities which offer solid risk to reward ratio, minimum is 1:2.

It is appropriate not to enter the market, while important fundamental reports are being announced. These have sometimes drastic effect on how the price is moving and it is better to stay out of the market.

Primary trading hours will be from 15:30 to 17:30 CET. Trader must accept fact there will be not as many trading opportunities as when trading whole session, but on the other hand it outweighs higher than enough liquidity.

4.2 Paper trading

Paper trading`s goal is to test the system on real time data, but only on fictional account. The biggest advantage of paper trading lies in its "*reality"*, because trader must do everything the same way as he will do later in live trading.

However, one factor cannot even paper trading adequately test. The factor is psychology. For discretional trader, psychology is one of key factors, which decide whether he will succeed or fail. Many novice traders tend to underestimate their psyche, as did author. But the paper trading showed that even profitable system does not mean that everything will go according to plan.

The chapter will describe the actual results of paper trading with commentary for months of June and July 2013. Focus will be aimed especially at psychology, as this factor has caused the actual results being worsened than predicted during back testing phase.

4.2.1 Result of paper trading – June 2013

The first month of paper trading has started in June 2013. The starting equity was 5000 US dollars. The expectations after back testing were more than higher, what can be one of the causes of not very good results in this month.

The trading started with one contract on e-mini S&P 500, supporting markets remain the same – e-mini Nasdaq 100 and e-mini Dow Jones Industrial Average. The preparations start at 15:00 with S/R levels identification. Also, trader must find out expected fundamental reports for particular trading day.

The results for June 2013 are as follows (see Appendix D1).

Fifteen trades have been executed during months, with Win% parameter only 13.3%. This amount of trades is enormous in comparison with back test. Author has tried to trade each, even slightly possibility what resulted into negative monthly results.

The first month ended in more than average loss. The final equity is 4464 USD, what represents drawdown of 13.63% what is more than the drawdown for the whole back testing. Also other parameters have worsened considerably, especially average profit per trade.

On the other hand, average loss is smaller than expected, with RRR 1:2.31.

What had such a significant effect on the negative results? As many times mentioned, author such as many other beginners underestimated the effect of psyche.

Author a lot of times entered into trades which had nothing in common with his trading strategy and thus most of losses occurred during June can be credited on the account of psyche.

Also another problem with psyche occurred when the trade was opened. Even, it is still paper trading and thus no real money are risked, author had problems, when price was moving against his position and exited the trade preliminary. Murphy`s laws work excellent in trading and right after the exit, price reversed and hit the profit target.

The mere strategy has proved as promising; however it is hard to judge the potential of strategy from one month.

4.2.2 Results of paper trading - July 2013

A major change has occurred right after the start of month. Author has decided to raise the starting equity for another 5000 USD in order to be able to trade simultaneously 2 contracts per one trade. All rules of money management are still respected. The increase offers author bigger variety with how the trade is managed, because two contracts can be exited on different prices and with different RRR. Stop-loss for both contracts is the same, i.e. 2 points for each contract. It is big risk, because author is still unable to properly execute trades with one contract, however the pros outweigh risk.

The starting equity for this month is final equity of previous (4467.70 USD) plus the increase (5000 USD).

The results for July 2013 can be found in Appendix E1.

The month ended in profit of 407 USD, what represents 203.5 USD per contract.

Twenty trades have been made, however because each contract is counted in diary as one trade, this must be divided by two. The final number is then ten.

The equity still does not offer stable growth, visible sharp peaks and bottoms are seen.

The Win% has growth to 40%, what is much better result than previous month.

The average profit has dropped to 109 USD, what is 36% drop from previous month. However, on the same time, average loss has dropped to 39 USD what represents 39% drop from month before. This gives RRR 1:2.79 per contract, which is higher than in June 2013.

The final equity ends with 9874 USD. This is major improvement and it also proves that trading with two positions can be easier even for beginners as it offers to reduce risk through setting more profit targets and thus profit even from worse entry situations.

The trading with more two contracts helped author`s psyche, because it enabled him to spread the risk for more contracts and particularly to trade for more than one profit target.

4.2.3 The possible threats for live trading

Author would like to emphasize, that he is well aware of threats that are associated with the proposal of system and its application into the real trading environment.

The results of back test and mainly results of paper trading are looking more than promising. As was mentioned, the paper trading will be conducted at least for another month or two and thus the results will likewise change before the system will be deployed into the real environment.

Author sees the biggest threat in what affect will have fact that real money will be at stake during live trading. This one key factor cannot be integrated into any paper trading and thus this factor remains unknown until system will be live traded. However, as was mentioned sooner in the thesis, author has already had an experience will live trading and thus this gives a good starting point for intraday trading as well.

Second threat could be the amount of slippage or lagging during live trading. In some cases, slippage can also cause problems; especially can occur during periods of extremely strong or extremely low volatility. However, author will deploy system into one of the most

liquid markets in the world with more than 1 million traded contracts a day and thus the amount of slippage should be almost equal to zero.

5. Proposals and Contribution of Suggested Solutions

Intraday trading is a suitable way of trading for people who look for big annual return for their capital. On the other hand, intraday trading is by author; s opinion the most demanding style of discretionary trading. It takes months or rather years to become really skilled intraday trader.

The author has described in previous chapters the main theoretical ideas the system is based on and also showed real outputs of strategy testing. This chapter will summarize the whole paper into one complex strategy or plan, which can be further use for intraday trading of stock indices.

5.1 The suggestion of trading system for stock indices

The system as a whole will mostly include how exactly to trade, i.e. how, when and why to enter, when to exit, will describe step by step the preparation for every session, but will also recommend how trader should work with his psychology.

The basic structure of proposed system can look as follows:

- the idea the system is built on,
- the style of trading the system uses,
- what markets system trades?,
- what broker trader uses? what are the fees?
- what software is required?
- when trader trades and what preparations are necessary before trading session?,
- what analysis trader takes into account,
- what are the basic patterns system has,
- money management,

- position sizing,
- psychological preparation.

The idea the system is built on

System is built on the basic presumptions:

- intermarket correlations,
- price trending/ ranging

Intermarket correlations – as proved in chapter Approaches to market analysis, there exist market which tend to strongly correlate and thus can be said there are strong ties between those markets. This also leads to the idea that markets which so strongly collate can create patterns, which can be identified and used for trader`s advantage.

Price trending/ ranging – the markets have only two ways how they move. They are either trending, i.e. creating new highs and lows or are moving in observable trading ranges. For more than a half of time, markets prefer to stick to trading ranges and thus this idea can be used in trader`s favor.

The style of trading the system uses

System is based on discretionary approach (see more in Styles of trading chapter). The trader has a system with tested rules and procedures, but still the trader has the last call whether to enter or stay out of potential trade. In the beginning of live trading, more emphasis will be on tested rules and procedures, because trader`s live experience will be small to none. However, as trader will become more and more skilled, the discretion can be more applied in decision making process. However, it does not mean, there will be no rules left. System will only be more based on the combination of rules and trader`s experience.

What markets system trades?

The system was primary created for US stock indices due their strong correlations. The markets are S&P 500, Nasdaq 100, Dow Jones Industrial Average. System uses e-mini contracts of those markets. However, only one market is traded at the moment and that is e-mini S&P 500.

Author sees possible development of system in trading simultaneously of all three markets, i.e. trading only the best situation no matter which market.

For paper trading and the beginning of live trading, there will be only e-mini SP and other two markets will be in the role of *"support"*, i.e. markets will serve how confirmation of price patterns.

What broker trader uses? What are the fees?

The author will use broker called Interactive Brokers. It is renowned US based broker with long history and very good reputation among retail traders.

The broker offers an optimal fee structure with more than acceptable commission for round turn (see more in chapter Back testing).

Another plus is fact, that author already uses the broker and his platform for other strategies, thus there is no need to look for another option.

Broker also offer very good margin requirements (see Styles of trading chapter).

What software is required?

The trader will use software for charting purposes (Sierra Chart) and supporting software, where all trades are recorded in form of data or as screenshots with notes.

The software was deeply described in chapter Back testing, thus there is no need to mention it again.

When trader trades and what preparations are necessary before trading session?

Trader only trades during regular trading hours (for more see chapter Back testing), never in premarket or aftermarket session due to drastic drop in liquidity, which could lead into massive slippage.

The actual trading starts at 15:30 CET, but the preparations for each session start at the furthest 45 minutes before the markets open. Trader must check how markets have been moving during premarket, prepare S/R levels for current day, make hypothesis based on previous price movements, whether the market will stay in trading ranges or will break out and start trending.

It is also necessary to check fundamental reports announced during the trading session as it was described in in chapter Back testing.

What analysis trader takes into account?

System is strongly built on technical analysis, particularly on price action (price patterns) and support and resistance levels with combination of volume profile.

It is also taken into account main fundamental reports which are reported during session, however trader does not use them as part of decision making process when speculate whether to enter long or short. They only affect whether to enter a trade or not.

S/R levels are the basic building block of the system. They are based on the premises that markets do trend or move in trading ranges. When moving in trading ranges, the edges of range are creating the strongest S/R levels.

For the identification of S/R levels, system uses 30 min TF, with help of volume profile tool. When the S/R is identified, the trader must decide how and where he will enter.

What most influence decision is previous history of price movement in last week, whether the market was more in downtrend or uptrend or stayed neutral.

Also must be taken into account the form of volume profile. The most favorable has an pyramidal shape as can be seen on Figure 13, trading range number 2. Then the trading range is considered to be neutral and thus can be traded on long and short side too, but only on the edges, where is the biggest probability of price reversal.

What is the basic patterns system has?

System primary uses one counter trend and one trend pattern.

The counter trend pattern is called **intermarket divergence**. The basic idea of pattern was described in chapters Approaches to market analysis and Back testing.

The pattern is mostly used in trading ranges, only at the edges of the trading range, where the strongest S/R levels lie. The pattern cannot be traded mechanically wherever in the graph, because then its probability drops drastically.

Once the divergence has been spotted, trader enters the trade when two consecutive bars with higher close are formed. Then, a limit or market order can be used to enter the trade.

The stop-loss is set under the low of first bar with higher close, but not more than two points.

The trend pattern is called **flip.**

Flips are sued in trending days after a confirmed break out of trading range has happened. This is quite rare pattern to see in its clearest form as described in Back testing chapter,

however it offers good risk to reward ratio, because it enables to catch the trend in its beginning.

The pattern must be also as the divergences be looked for only in S/R levels, there is no sense to trade flips anywhere in the graph.

The enter after pattern has been spotted can be done more aggressive, when price tries to retest the S/R level or wait whether the price will move in to the desired direction and then enter.

The stop loss is set behind the S/R, if enter occurred during retesting of level or two ticks up/under the high/low of entry bar, but not more than two points.

Money management

The starting equity for live trading will be 10000 US dollars.

The risk for one trade, no matter how many contracts are included is 2% of whole equity, thus 200 US dollars

The basic stop-loss deducted from performed back-testing is 2 points (100 USD) for both patterns. However, the stop-loss in some situations can be lower due to fact how entry into the trade will be managed. The stop-loss is used as fixed parameter, i.e. its value does not change with equity growth or decrease. Further adjustments are likewise.

Live trading will stop, if the drawdown of equity will reach 30% of starting capital – 3000 USD, what would mean 15 consecutive losses.

The profit targets are set as 5 points for divergences and 4 points for flips. This however can be changed due to the amount of risked money, but the risk reward ratio must be still 1:2 at least.

It must be expected, that when using market order for entering or exiting, a slippage will occur. Due to fact, that ES is extremely liquid market, the average slippage when using market order is 0.25 ticks (12.5 USD) per contract.

Thus it is preferable to use for both entering and exiting limit order which eliminate the risk of slippage.

The commission for one contract (RT) is 4.02 USD.

The maximum amount of equity held in margins cannot exceed more than 50% of whole equity, thus no more than 5000 USD at one moment in margins.

Position sizing

As showed results of paper trading, great potential lies in position sizing, i.e. simultaneously trading more than one contract per trade.

Due to starting equity and rules set by money management, two contracts will be trade at the beginning of live trading.

The stop-loss stays the same for both contracts; it is 2 points per each.

The profit targets can be divided, with one contract exiting at RRR 1:1.2 and second at 1:2. This will keep overall RRR for one contract at the ratio of 1:2.

Psychological preparations

As discretionary trader, author also must incorporate in its strategy his own psyche and mental health. The amount of stress received in live trading must be compensated through mental and psychical exercises in order to keep mentally fit.

The minimum should be at least to exercise three times a week like jogging, fitness or swimming.

Because trading is quite lonely profession, trader must also socialize with other people during weekends.

At the end of chapter, author feels to emphasize, that presented trading strategy is still in the phase of development and thus it is likely some processes or procedures, especially in position sizing and psychological preparations will change one the system will be live traded. However, author still offers a complex insight to how a trading strategy should look like for intraday trading.

6. Conclusions

The aim of the master`s thesis was to provide a trading strategy for intraday trading of stock indices.

The author has described basic principles of trading and futures market, the styles of trading, approaches to market analysis and money management in theoretical basis.

The analytical part has described the actual situation of intraday strategy being developed. The forms of used patterns, money management, and traded markets were described. Also the broker of author has been introduced.

The process of back testing has described the basic tools which are crucial to successful building any trading strategy and also represented the results from months of June 2012 till January 2013 with recommendations about stop-loss and profit target. Back testing also proved that system is profitable on historical data; however this fact does not secure future success of strategy.

The paper trading revealed some weakness of strategy, especially the psychology showed as the biggest obstacle in order to become consistently profitable. It also showed the power of position sizing and how can even the addition of one contract and small changes to profit targets influence the final results. At the end of paper trading chapter, author has provide an list of most possible threats which can occur during initial phase of live trading and thus influence the results achieved during paper trading phase.

The recommendations present an actual trading strategy with its basic rules and described processes. The author has provided and full list of basic principles needed to construct an intraday strategy for stock indices or for any strongly correlated markets. Because the system is still in the phase of testing, it is more than probable that some factors will likely

change in future, because as trader`s experience will rise, so will the plan adjust to the acquired experience.

Only the live trading will in the end prove whether the proposed system is viable for intraday trading or will as many systems before fail.

Trading is by author`s opinion one of the toughest businesses in the world. It requires from trader to be fully committed and takes a lot of time and effort in order to become successful. Trader will have to get through many obstacles on his path, but in the end he can achieve an absolute independence in terms of finance.

Trading has fascinated many people including author but as any other business, only the best and most resilient will succeed.

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8. Figure and table list

9. List of appendices

Appendix A

Table 1: Index Composition by 31.12.2012

Sector	**Percentage**
Energy	10,99%
Materials	3,62%
Industrials	10,12%
Consumer Discretionary	11,50%
Consumer Staples	10,61%
Health Care	12,01%
Financials	15,61%
Information Technology	19,04%
Telecommunication Services	3,06%
Utilities	3,43%
S&P 500	100,00%

Source: Spindices.com

Appendix B

Table 2: Margin requirements for US stock indices

Ticker	Product	Intraday margin	Overnight margin	Currency
ES	E-mini S&P 500	2188	4375	USD
NQ	E-mini NASDAQ 100	1375	2750	USD
YM	Mini Sized Dow Jones Industrial Average $5	1713	3425	USD

Source: Interactivebrokers.com

Appendix C

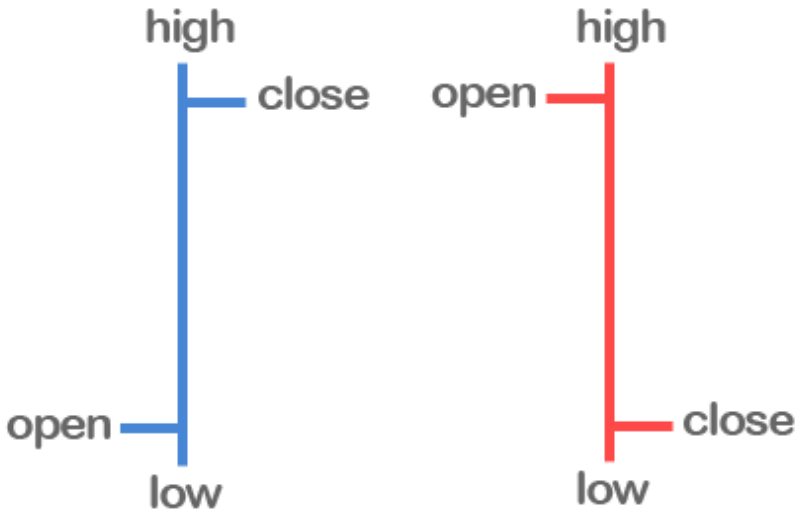
Table 3: The most used charting software with average monthly fees

Product	**Fees/month in USD**
E-Signal	137 USD
Ninja Trader	50 USD
MultiCharts	66 USD
Sierra Chart	26 USD
TD Ameritrade	10 USD

Source: Author, data used from Toptenreviews.com

Appendix D

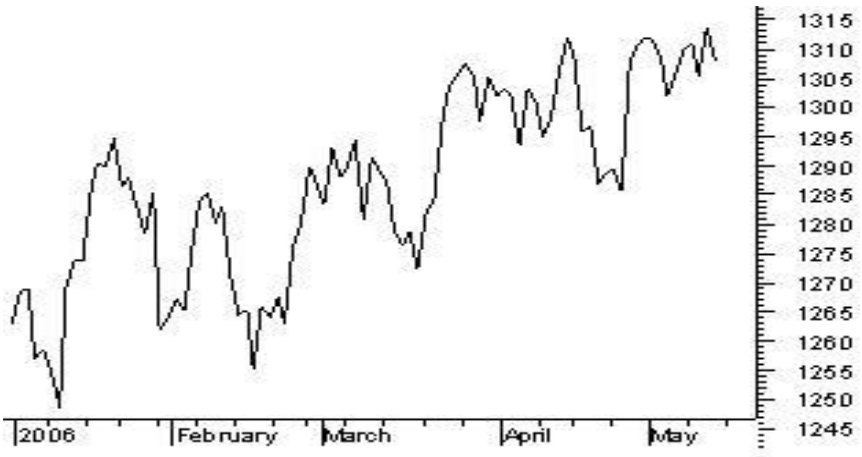
Figure 3: OHLC bars



Source: Nuusaforex.com

Appendix E

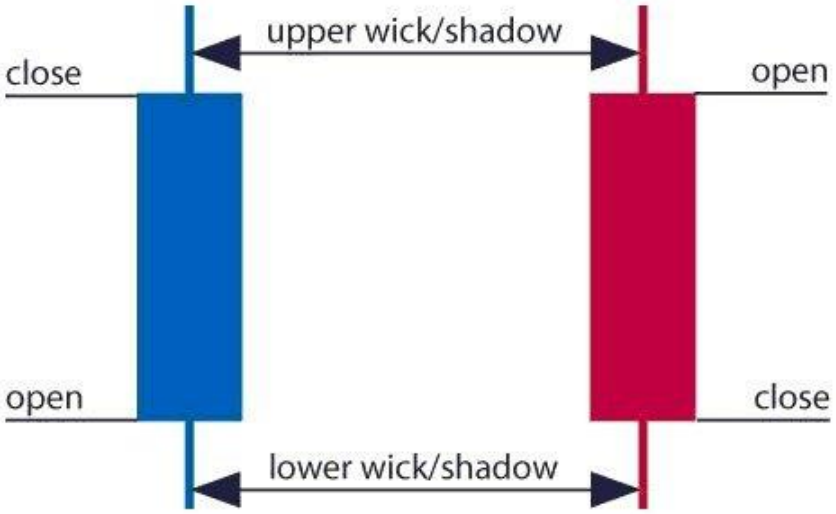
Figure 4: Line chart - monthly graph



Source: Pcmbrokers.com

Appendix F

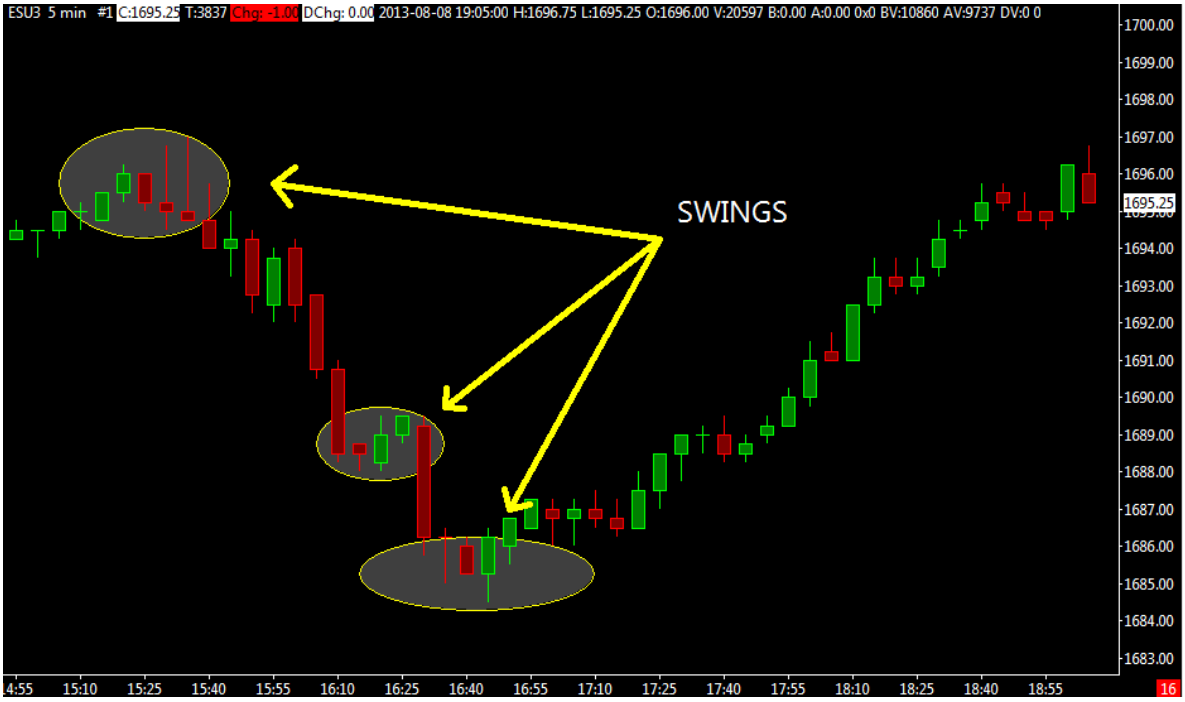
Figure 5: Candlestick bars



Source: Yahoo Finance

Appendix G

Figure 6: Swings - e-mini S&P 500, 5 min time frame, 8.8.2013



Source: Author

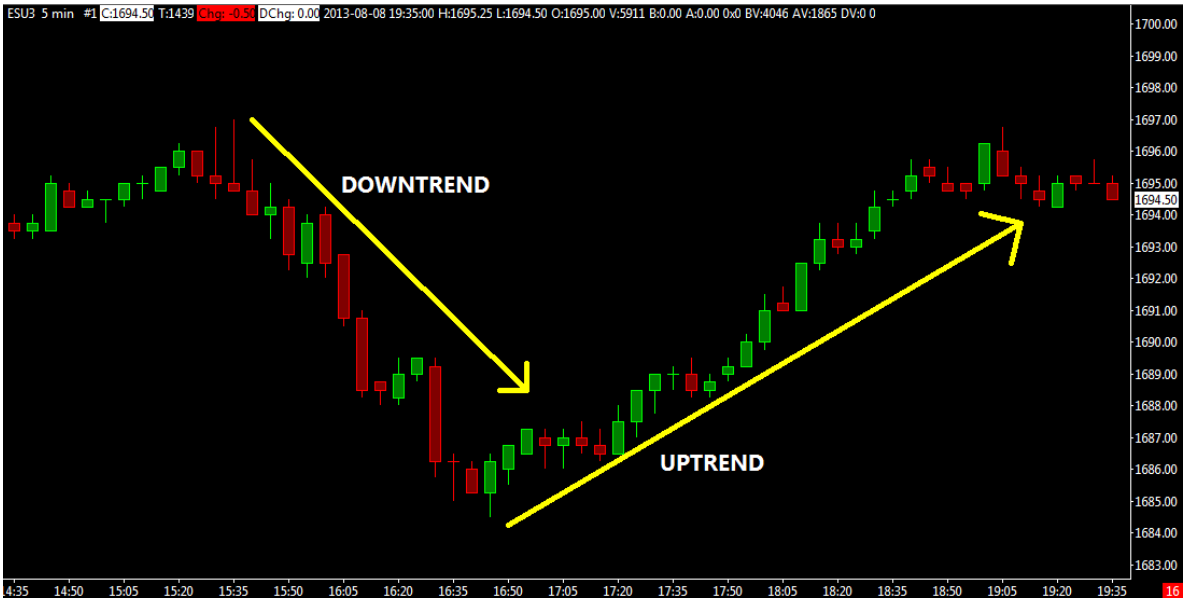
Appendix H

Figure 7: Trends on monthly graph

Source: Pmcbrokers.com

Appendix I

Figure 8: Downtrend and uptrend - e-mini S&P 500, 5 min time frame, 8.8.2013



Source: Author

Appendix J

Figure 9: Support and resistance - weekly graph

Source: Pmcbrokers.com

Appendix K

Figure 10: US indices correlation, June 2013

Index Correlations | YTD June 2013

	S&P 500	S&P MidCap 400	S&P SmallCap 600	DJIA	ND100	R2000	DJ U.S. Real Estate	Nikkei 225	Brazil Ibovespa	CSI 300	S&P CNX Nifty	MEXBOL
S&P 500	100.00%											
S&P MidCap 400	93.52%	100.00%										
S&P SmallCap 600	91.74%	95.80%	100.00%									
DJIA	96.63%	87.66%	86.81%	100.00%								
NASDAQ-100	91.83%	84.17%	81.25%	85.43%	100.00%							
Russell 2000	92.45%	96.70%	99.38%	87.08%	83.20%	100.00%						
DJ U.S. Real Estate	79.10%	79.12%	73.51%	76.04%	65.58%	73.97%	100.00%					
Nikkei 225	-5.33%	-0.59%	1.30%	-7.63%	-10.54%	-1.07%	1.54%	100.00%				
Brazil Ibovespa	47.69%	49.52%	48.06%	46.46%	42.53%	47.73%	41.92%	-5.32%	100.00%			
CSI 300	13.37%	14.26%	15.40%	10.81%	16.24%	15.09%	10.01%	25.47%	8.05%	100.00%		
S&P CNX Nifty	30.75%	32.07%	28.98%	27.27%	28.70%	29.20%	27.27%	24.57%	11.76%	26.47%	100.00%	
MEXBOL	53.31%	54.94%	49.58%	49.94%	50.89%	51.54%	49.47%	10.06%	29.21%	20.35%	32.53%	100.00%

Source: Cmegroup.com

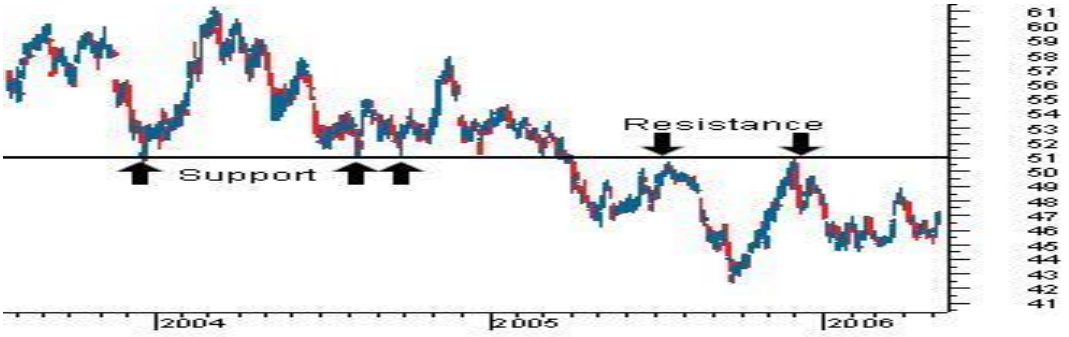
Appendix L

Figure 11: Intermarket divergences - e-mini S&P 500, 2 min time frame, 9.8.2013

Source: Author

Appendix M

Figure 12: Flip – monthly graph



Source: pmcbrokers.com

Appendix N

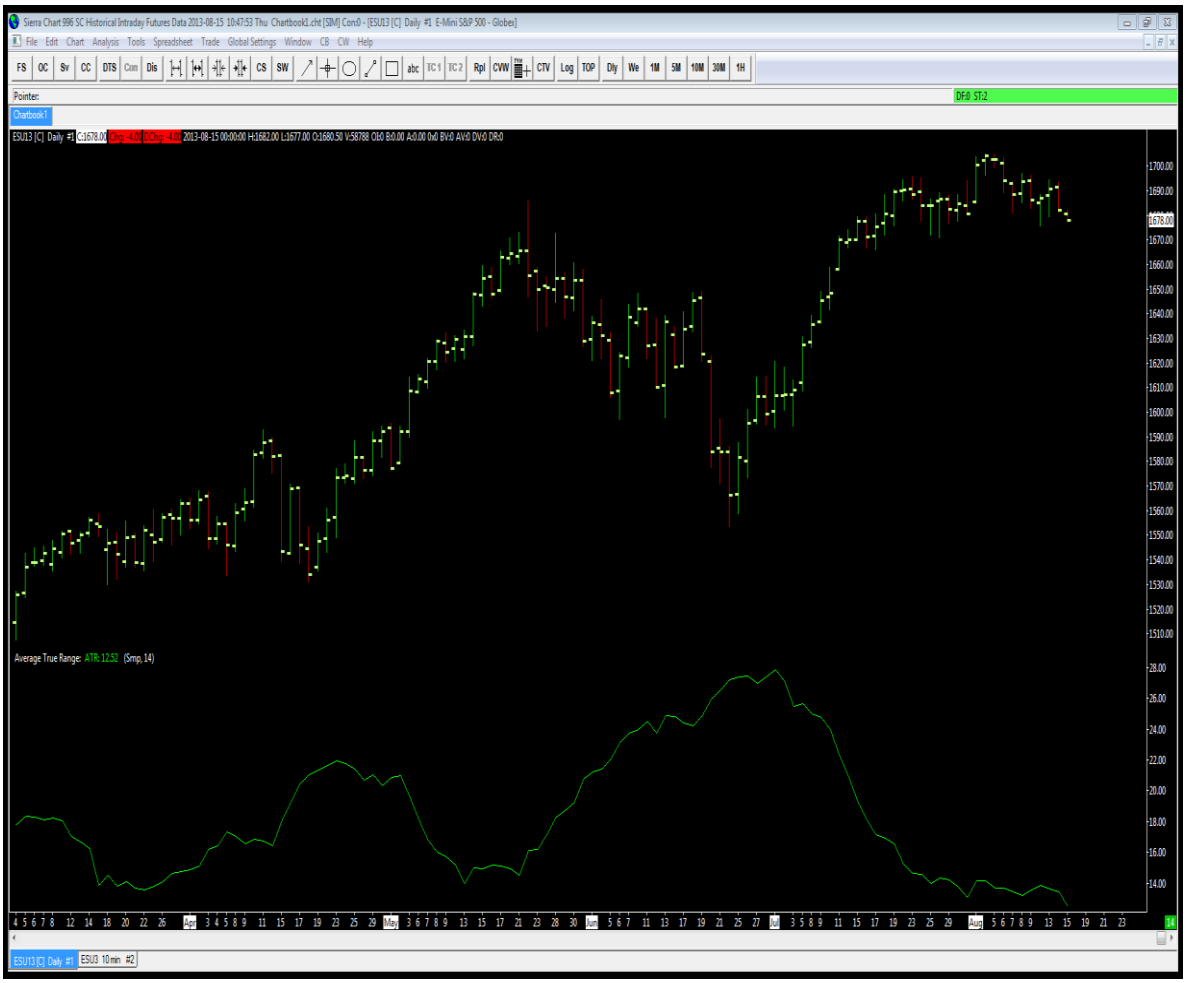
Figure 13: Profitability calculation

Number of trades	100
Average profit	200 USD
Average loss	100 USD
RRR	1:2
Win%	40%
Profit/loss	2000 USD
Profit/loss per trade	20 USD

Source: Author

Appendix O

Figure 14: Average price movement on e-mini S&P 500, daily time frame, April - August 2013

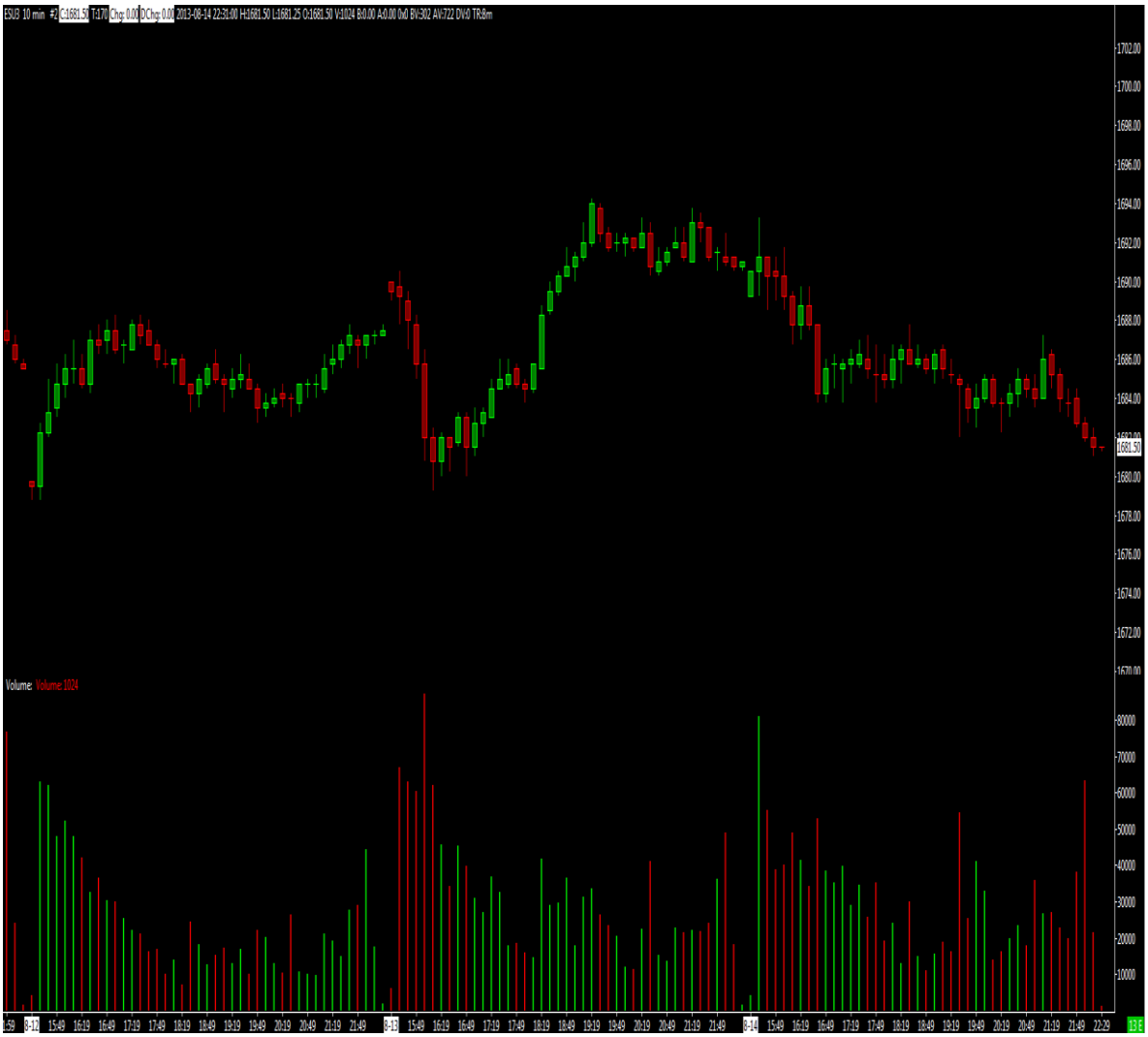


Source: Author

In order to determine average daily price movement, indicator Average True Price was applied on the chart. As can be seen, most volatile price movements were done in month of January, February, June and July.

Appendix P

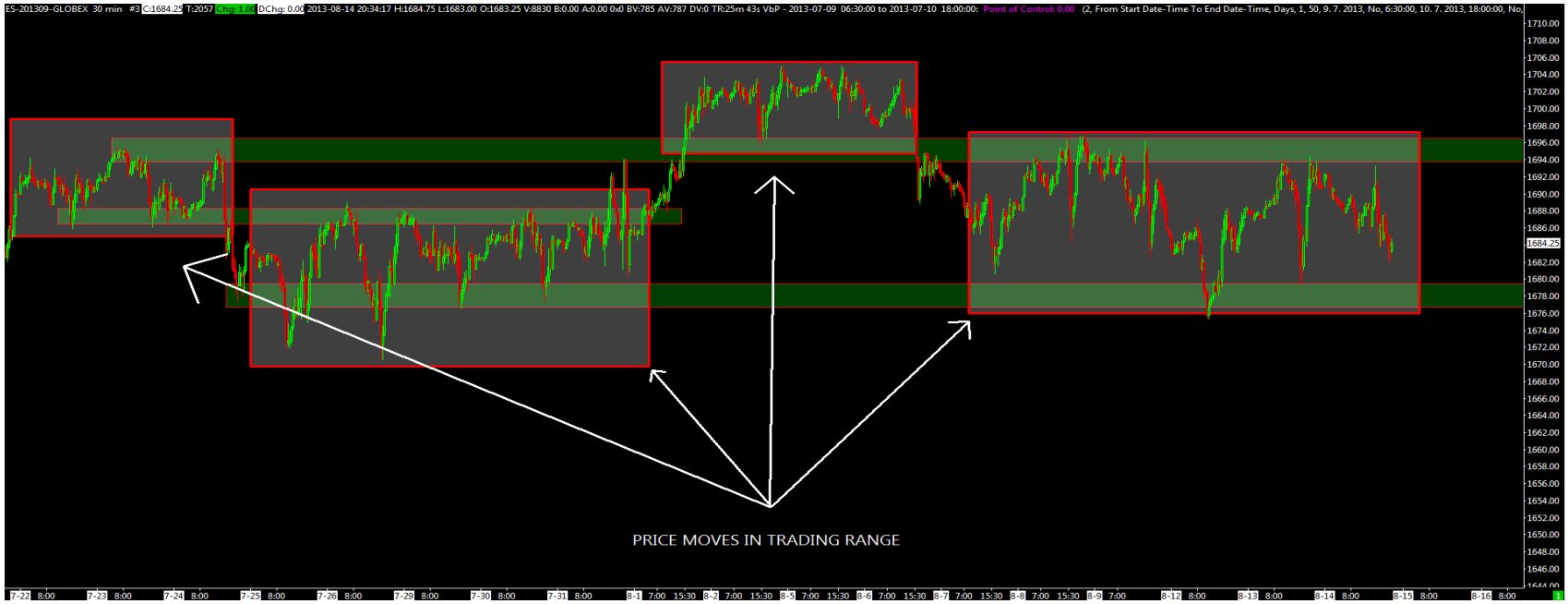
Figure 15: Development of volume over period of time, ES, 10 min TF, 12.8 – 14.8.2013



Source: Author

Appendix Q

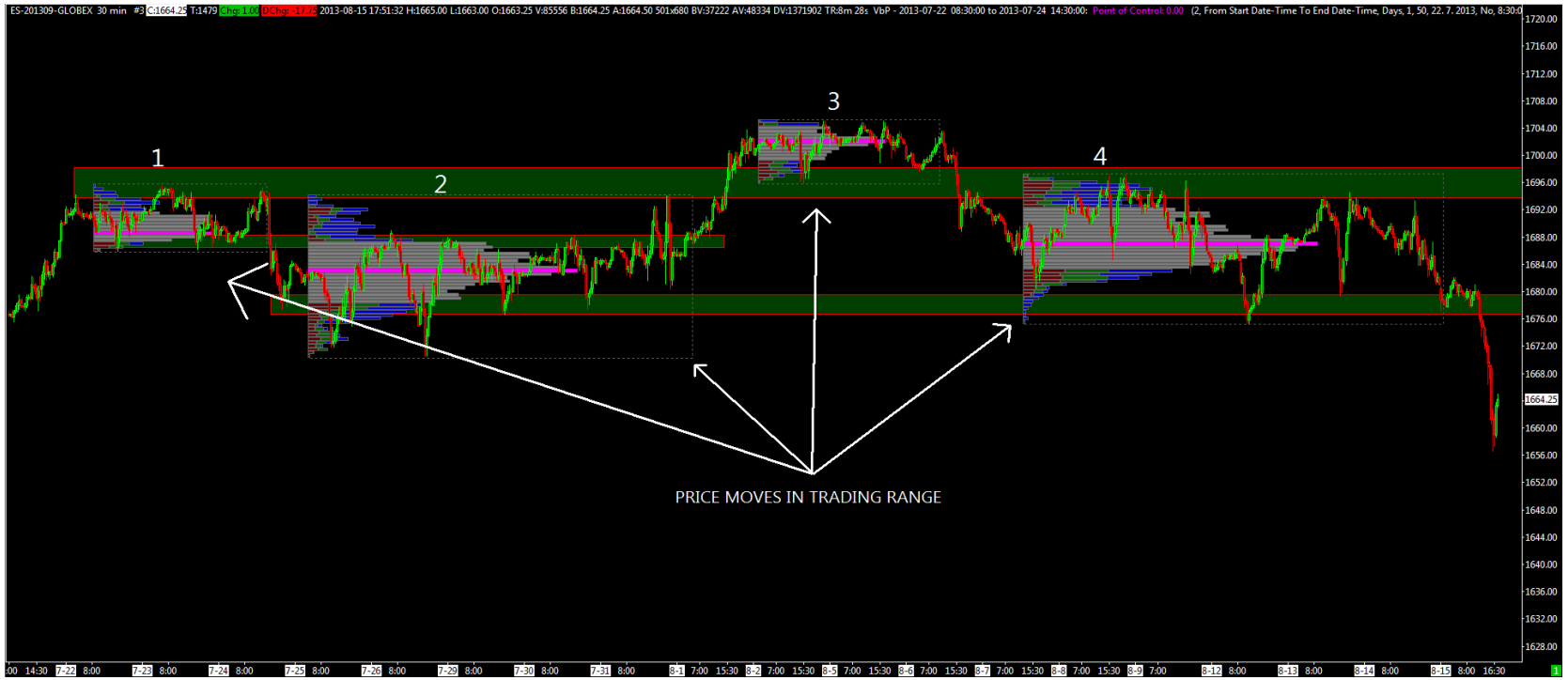
Figure 16: S/R identification process, ES, 30 min TF, 22.7.-15.8.2013



Source: Author

Appendix R

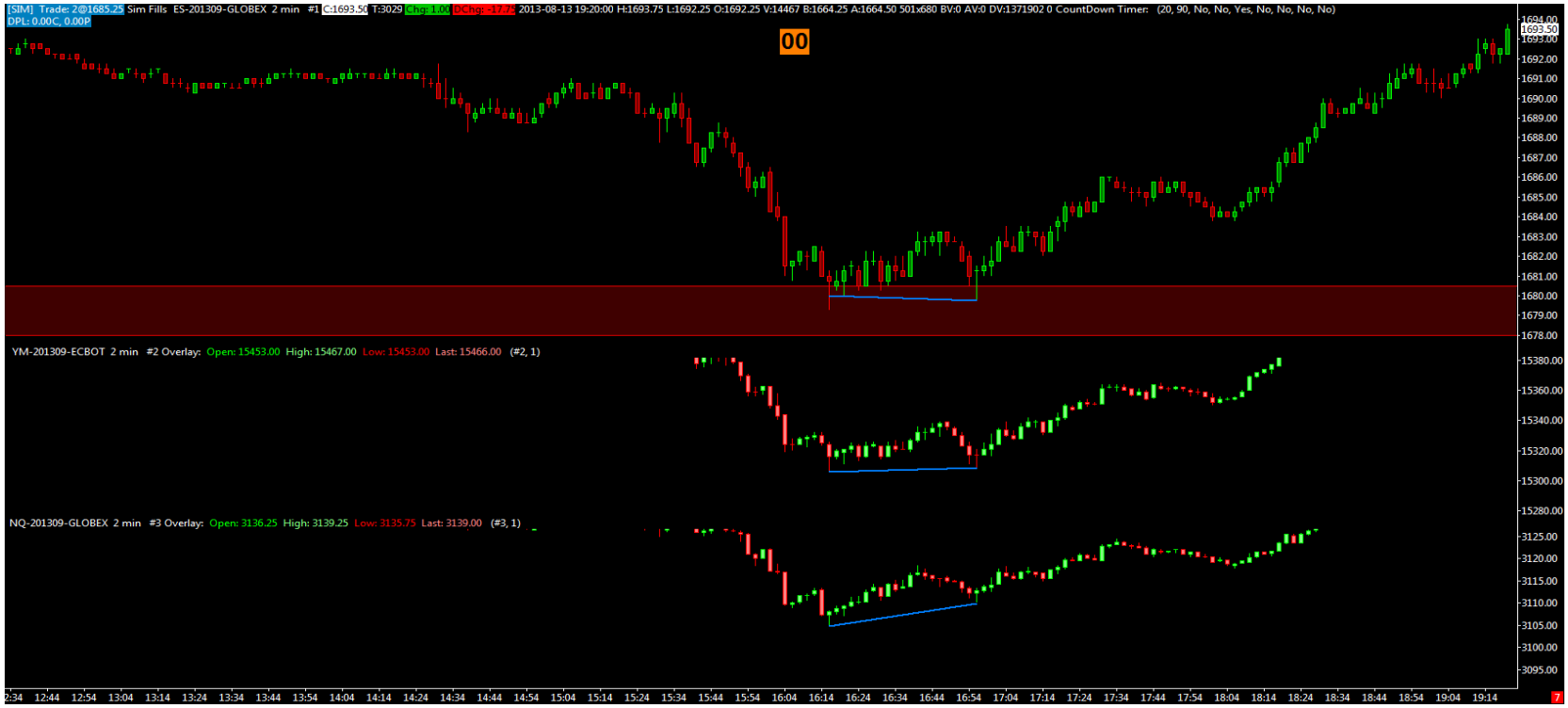
Figure 17: Application of volume profile, ES, 30 min TF, 22.7.-15.8.2013



Source: Author

Appendix S

Figure 18: Intermarket divergence, ES, 3 min TF, 13.8.2013



Source: Author

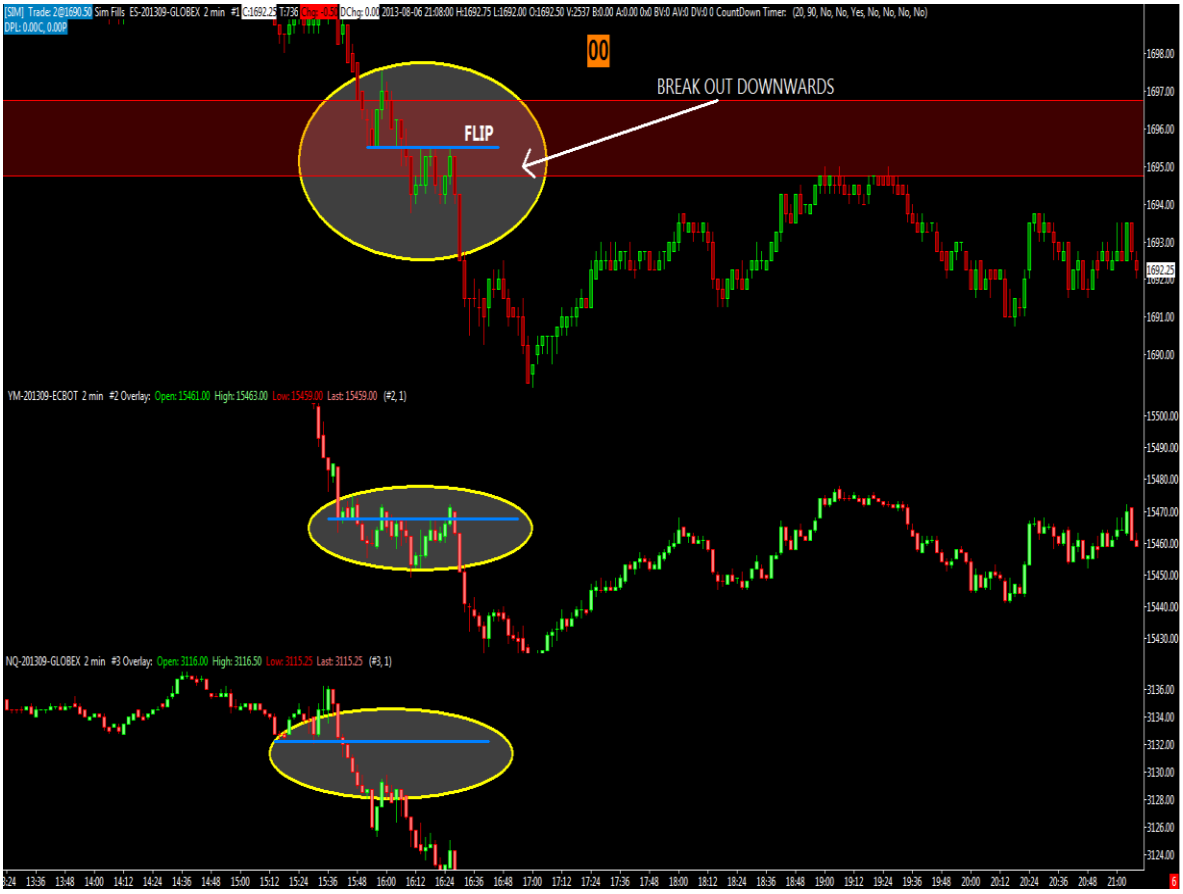
Appendix T

Figure 19: Demonstration of flip pattern, ES, 30 min TF, 2.8-14.8.2013

Source: Author

Appendix U

Figure 20: Flip pattern, ES, 2 min TF, 6.8.2013



Source: Author

Appendix V

Figure 21: List of trades conducted during MAE/MFE analysis

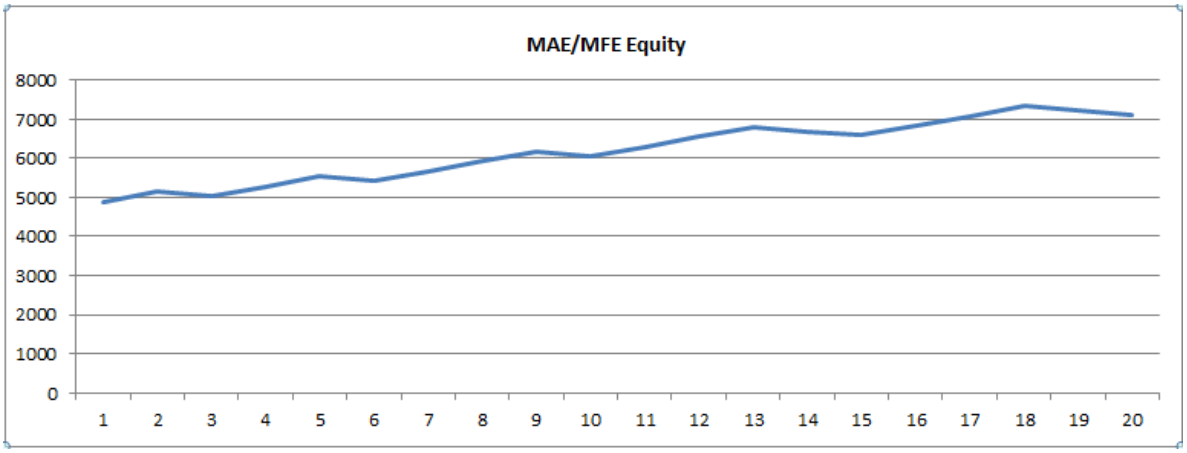
1	Date	Tim	Market	Number of contrac	Pattern	Entry	Exit	MAE	MFE	SL	PT
3	5.6.2012	16:24	ES	-1	IMD3	1283		1284,5	1277,5		
4	7.6.2012	17:18	ES	1	IMD3	1317,75		1317,75	1325		
5	11.6.2012	21:39	ES	-1	Flip	1315		1316,5	1307		
6	12.6.2012	18:00	ES	1	Flip	1316,25		1314	1320,25		
7	13.6.2012	17:24	ES	-1	Flip	1324,75		1326	1320		
8	13.6.2012	18:54	ES	-1	IMD3	1325,75		1327	1317		
9	14.6.2012	19:03	ES	-1	IMD3	1327		1328	1320,75		
10	18.6.2012	15:57	ES	1	Flip	1331		1331	1339		
11	18.6.2012	19:45	ES	-1	IMD3	1339,5		1341,75	1335,75		
12	21.6.2012	17:51	ES	-1	Flip	1337,5		1338	1329,25		
13	21.6.2012	21:36	ES	-1	Flip	1322		1324	1318		
14	22.6.2012	20:39	ES	-1	IMD3	1327		1330,5	1327		
15	22.6.2012	21:54	ES	1	Flip	1329,75		1327,25	1330,75		
16	25.6.2012	18:27	ES	-1	Flip	1305,5		1306	1303,25		
17	27.6.2012	15:45	ES	1	IMD3	1452,75		1448	1458		
18	28.6.2012	17:27	ES	-1	Flip	1312,25		1314	1307		
19	29.6.2012	15:45	ES	1	IMD3	1312,25		1342,75	1350,5		
20	3.7.2012	18:51	ES	1	Flip	1364,5		1364	1369		
21	5.7.2012	20:51	ES	1	Flip	1365,75		1363	1366		
22	10.7.2012	16:45	ES	-1	Flip	1347,25		1347,25	1342,5		
23	16.7.2012	16:54	ES	1	Flip	1349,75		1345,75	1350,75		
24	16.7.2012	18:36	ES	1	IMD3	1347,25		1345,75	1351,5		
25	17.7.2012	17:24	ES	-1	Flip	1345,25		1350	1344		
26	17.7.2012	18:48	ES	-1	IMD3	1355		1353	1360		
27	18.7.2012	17:24	ES	1	Flip	1364,5		1364,5	1370,25		
28	23.7.2012	15:30	ES	-1	IMD3	1338,5		1338,75	1332,25		
29	24.7.2012	18:48	ES	-1	IMD3	1330		1331,5	1323,5		
30	25.7.2012	16:00	ES	1	IMD3	1334		1334	1330,5		
31	26.7.2012	17:42	ES	1	IMD3	1348		1346,5	1354,5		
32	9.8.2012	16:39	ES	-1	IMD3	1401,75		1402,75	1395,5		
33	13.8.2012	18:27	ES	1	IMD3	1395,25		1395	1401,75		
34	21.8.2012	15:51	ES	1	IMD3	1418,5		1418,5	1424,75		
35	30.8.2012	15:54	ES	-1	IMD3	1402		1402,75	1395,5		
36	12.9.2012	19:21	ES	-1	IMD3-chop	1437,75		1438,5	1432		
37	20.9.2012	15:45	ES	1	IMD3	1452,75		1450	1458		
38	26.9.2012	16:03	ES	-1	Flip	1432,5		1433	1424		
39	28.9.2012	19:12	ES	1	Flip	1433,75		1433,75	1440		
40	2.10.2012	18:54	ES	-1	Flip-chop	1437,25		1437,25	1434,75		
41	3.10.2012	17:39	ES	1	Flip-chop	1445,25		1444,75	1448,75		
42	18.10.2012	16:27	ES	1	IMD3	1452,25		1451,75	1459,75		
43	23.10.2012	16:04	ES	-1	Flip	1411		1412	1402		
44	26.10.2012	15:51	ES	1	Flip	1408,75		1404,25	1409,5		
45	26.10.2012	18:00	ES	-1	Flip	1400,25		1403,25	1398,75		
46	15.1.2013	17:24	ES	-1	IMD3-chop	1462,25		1464,75	1462		

Source: Author

Appendix W

Figure 22: First profit/loss scenario for intermarket divergences

	Real trades	Exit SL/PT	MAE/MFE
First trade:			1.6.2012
Last trade:			18.10.2012
Starting equity:			$5 000,00
Net win / loss:			**$2 119,60**
Final equity:			$7 119,60
Number of trades:			20
Win trades:			12
Loose trades:			8
% Win:			**60,00%**
Biggest profit:			$245,98
Biggest loss:			-$104,02
Average profit:			$246,00
Average loss:			-$104,00
Average trade:			**$105,98**
Max. Drawdown:			**-$312,06**
Max. Drawdown %:			-6,24%

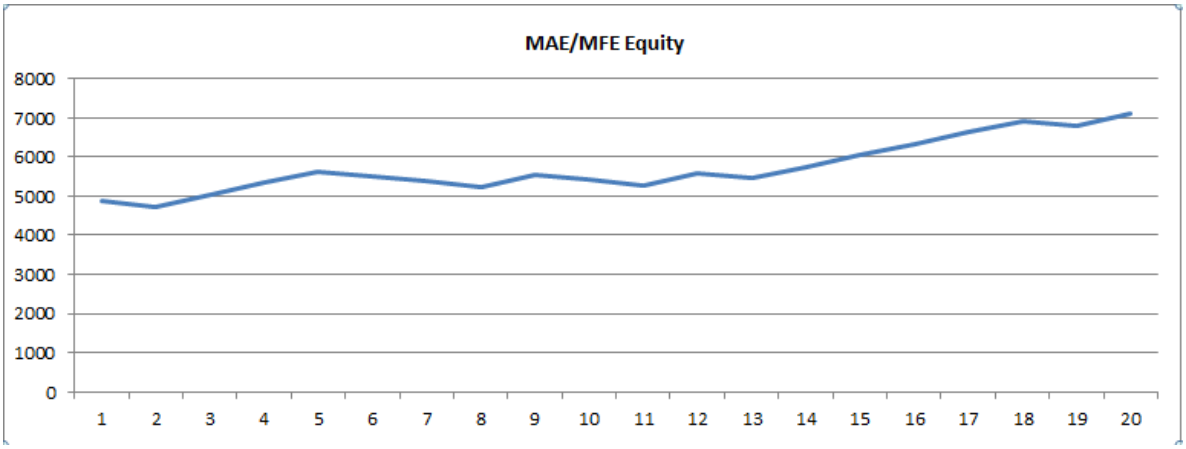


Source: Author

Appendix X

Figure 23: Seconds profit/loss scenario for intermarket divergences

	Real trades	Exit SL/PT	MAE/MFE
First trade:			1.6.2012
Last trade:			18.10.2012
Starting equity:			$5 000,00
Net win / loss:			**$2 094,60**
Final equity:			$7 094,60
Number of trades:			20
Win trades:			11
Loose trades:			9
% Win:			**55,00%**
Biggest profit:			$295,98
Biggest loss:			-$129,02
Average profit:			$296,00
Average loss:			-$129,00
Average trade:			**$104,73**
Max. Drawdown:			**-$387,06**
Max. Drawdown %:			-7,74%

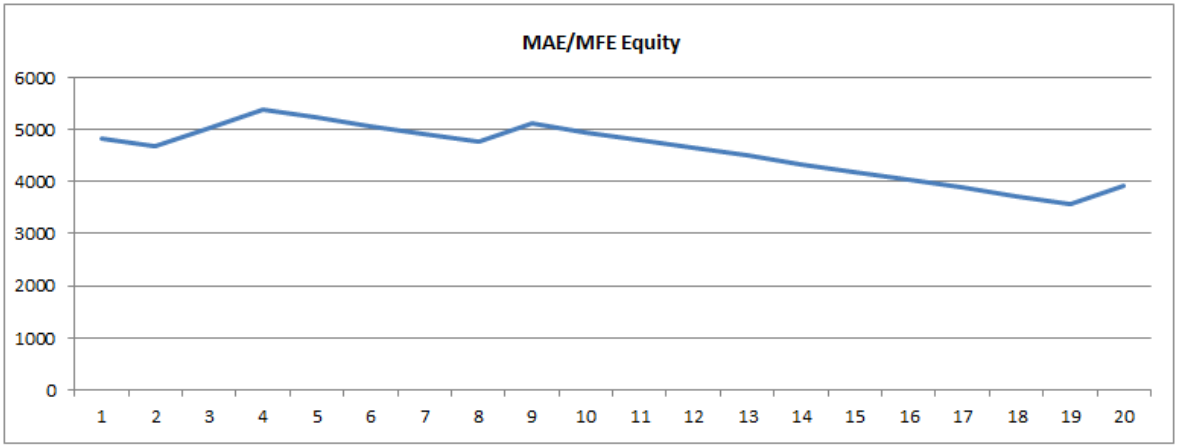


Source: Author

Appendix Y

Figure 24: Third profit/loss scenario for intermarket divergences

	Real trades	Exit SL/PT	MAE/MFE
First trade:			1.6.2012
Last trade:			18.10.2012
Starting equity:			$5 000,00
Net win / loss:			**-$1 080,40**
Final equity:			$3 919,60
Number of trades:			20
Win trades:			4
Loose trades:			16
% Win:			**20,00%**
Biggest profit:			$345,98
Biggest loss:			-$154,02
Average profit:			$346,00
Average loss:			-$154,00
Average trade:			**-$54,02**
Max. Drawdown:			**-$1 810,30**
Max. Drawdown %:			-36,21%

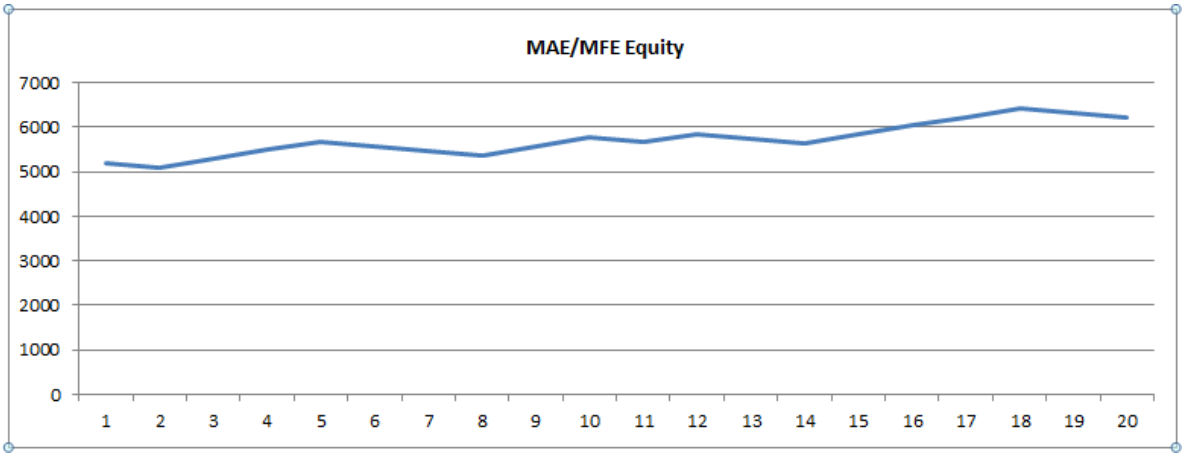


Source: Author

Appendix Z

Figure 25: First scenario for flips

	Real trades	Exit SL/PT	MAE/MFE
First trade:			11.6.2012
Last trade:			26.10.2012
Starting equity:			$5 000,00
Net win / loss:			**$1 219,60**
Final equity:			$6 219,60
Number of trades:			20
Win trades:			11
Loose trades:			9
% Win:			**55,00%**
Biggest profit:			$195,98
Biggest loss:			-$104,02
Average profit:			$196,00
Average loss:			-$104,00
Average trade:			**$60,98**
Max. Drawdown:			**-$312,06**
Max. Drawdown %:			-6,24%

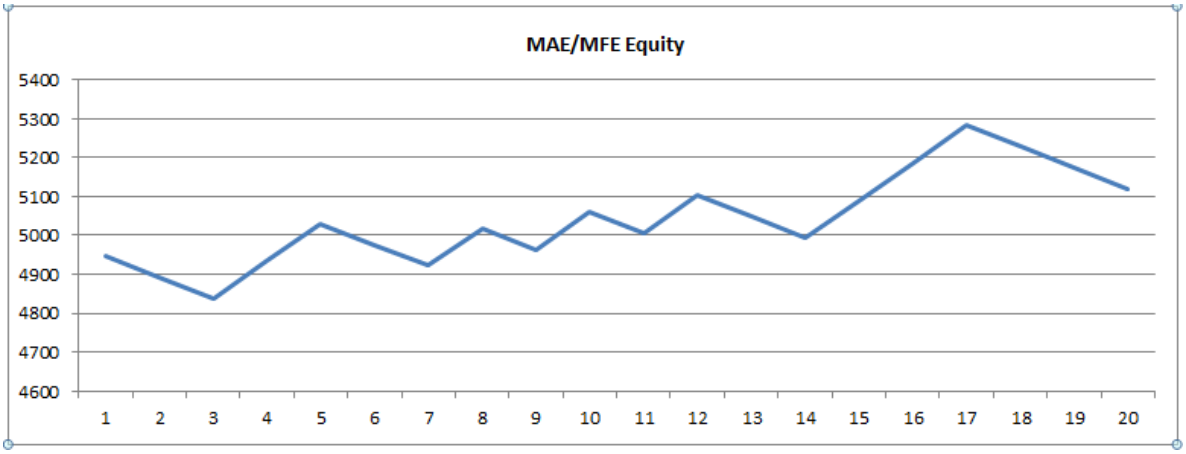


Source: Author

Appendix A1

Figure 26: Second scenario for flips

	Real trades	Exit SL/PT	MAE/MFE
First trade:			11.6.2012
Last trade:			26.10.2012
Starting equity:			$5 000,00
Net win / loss:			**$119,60**
Final equity:			$5 119,60
Number of trades:			20
Win trades:			8
Loose trades:			12
% Win:			**40,00%**
Biggest profit:			$95,98
Biggest loss:			-$54,02
Average profit:			$96,00
Average loss:			-$54,00
Average trade:			**$5,98**
Max. Drawdown:			**-$162,06**
Max. Drawdown %:			-3,24%

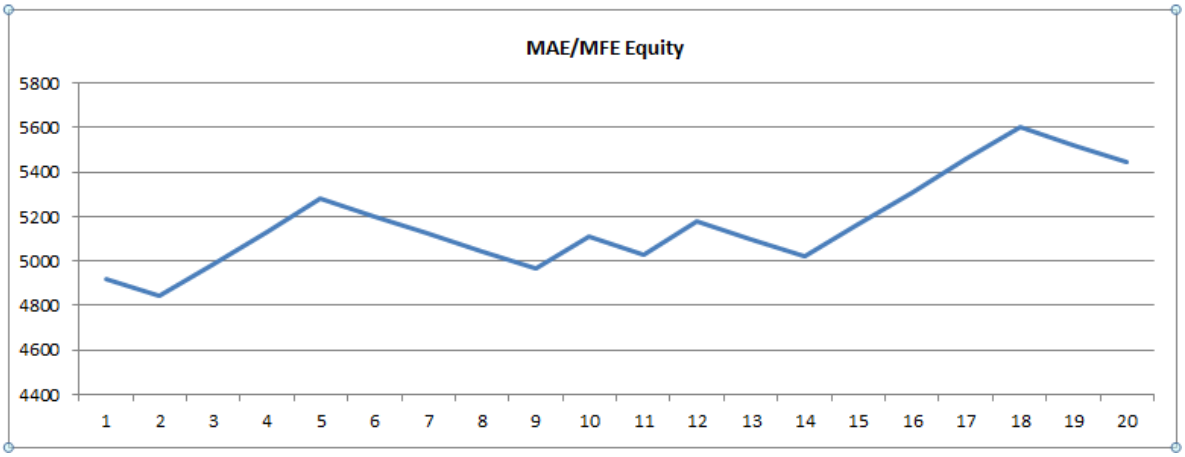


Source: Author

Appendix B1

Figure 27: Third scenario for flips

	Real trades	Exit SL/PT	MAE/MFE
First trade:			11.6.2012
Last trade:			26.10.2012
Starting equity:			$5 000,00
Net win / loss:			**$444,60**
Final equity:			$5 444,60
Number of trades:			20
Win trades:			9
Loose trades:			11
% Win:			**45,00%**
Biggest profit:			$145,98
Biggest loss:			-$79,02
Average profit:			$146,00
Average loss:			-$79,00
Average trade:			**$22,23**
Max. Drawdown:			**-$316,08**
Max. Drawdown %:			-6,32%

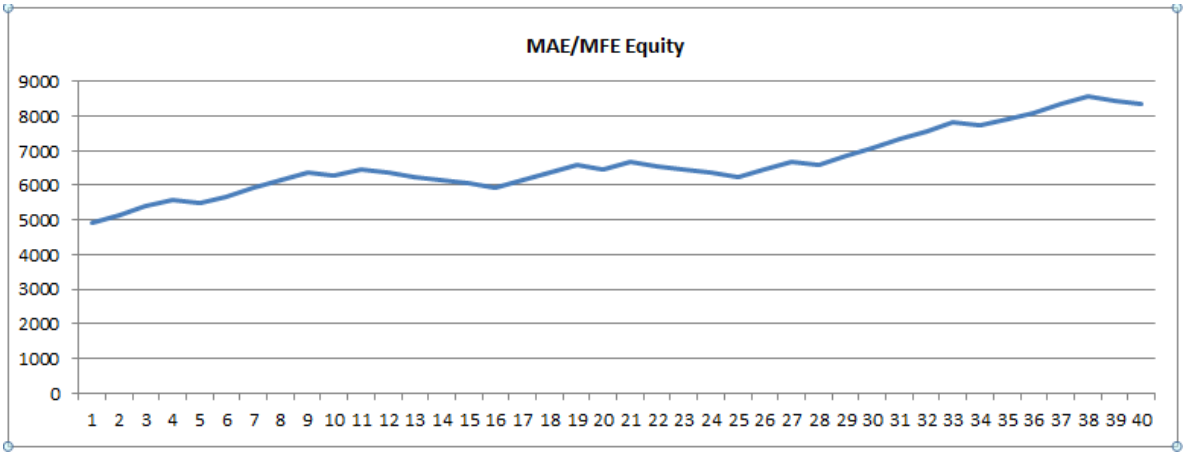


Source: Author

Appendix C1

Figure 28: Overall results of backtesting

	Real trades	Exit SL/PT	MAE/MFE
First trade:			1.6.2012
Last trade:			26.10.2012
Starting equity:			$5 000,00
Net win / loss:			**$3 339,20**
Final equity:			$8 339,20
Number of trades:			40
Win trades:			23
Loose trades:			17
% Win:			**57,50%**
Biggest profit:			$245,98
Biggest loss:			-$104,02
Average profit:			$222,09
Average loss:			-$104,00
Average trade:			**$83,48**
Max. Drawdown:			**-$520,10**
Max. Drawdown %:			-10,40%

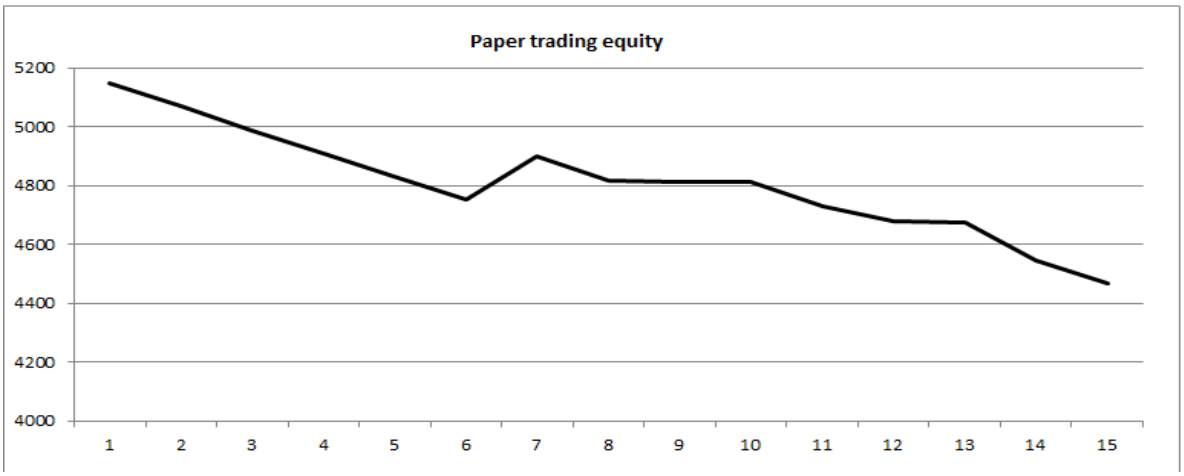


Source: Author

Appendix D1

Figure 29: Results for paper trading – June 2013

	Paper trading	MAE/MFE
First trade:	28.5.2013	28.5.2013
Last trade:	24.6.2013	24.6.2013
Starting equity:	$5 000,00	$5 000,00
Net win / loss:	-$535,30	**-$310,30**
Final equity:	$4 464,70	$4 689,70
Number of trades:	15	15
Win trades:	2	4
Loose trades:	13	11
% Win:	13,33%	**26,67%**
Biggest profit:	$145,98	$245,98
Biggest loss:	-$129,02	-$104,02
Average profit:	$146,00	$208,50
Average loss:	-$63,62	-$104,00
Average trade:	**-$35,69**	**-$20,69**
Max. Drawdown:	-$681,28	**-$544,22**
Max. Drawdown %:	-13,63%	-10,88%

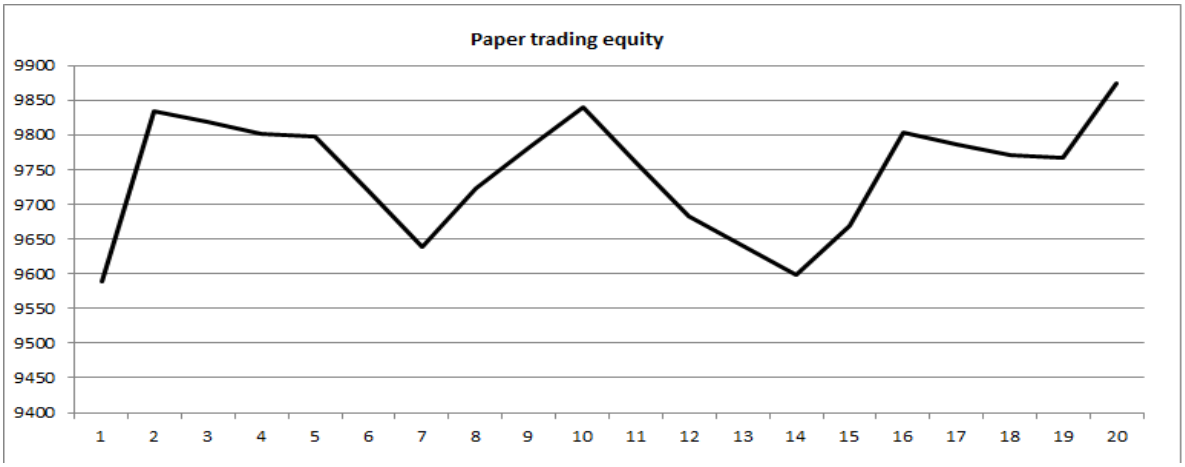


Source: Author

Appendix E1

Figure 30: Results for paper trading - July 2013

	Paper trading	MAE/MFE
First trade:	2.7.2013	2.7.2013
Last trade:	30.7.2013	30.7.2013
Starting equity:	$9 467,70	$9 467,70
Net win / loss:	$407,10	**-$80,40**
Final equity:	$9 874,80	$9 387,30
Number of trades:	20	20
Win trades:	8	6
Loose trades:	12	14
% Win:	40,00%	**30,00%**
Biggest profit:	$245,98	$245,98
Biggest loss:	-$79,02	-$104,02
Average profit:	$109,75	$229,33
Average loss:	-$39,67	-$104,00
Average trade:	**$20,35**	**-$4,02**
Max. Drawdown:	-$241,08	**-$1 040,20**
Max. Drawdown %:	-2,55%	-10,99%



Source: Author